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RADIO CONTROL

car action

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FACTORY TEAM RC18T VS MINI-T PRO

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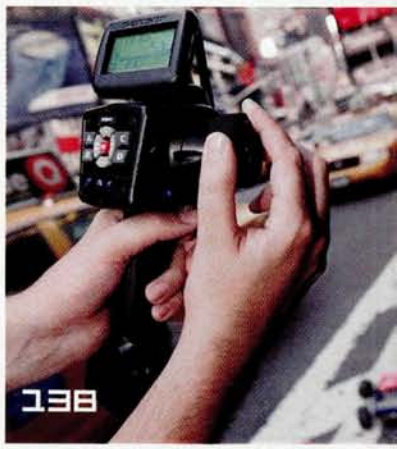

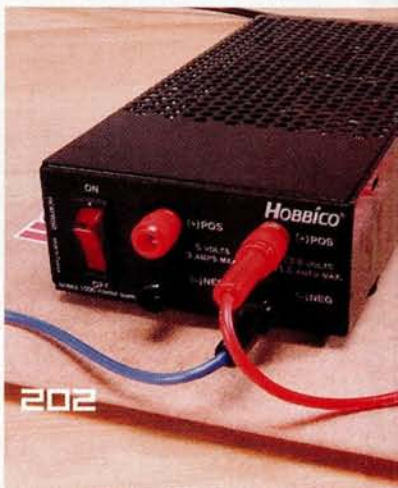

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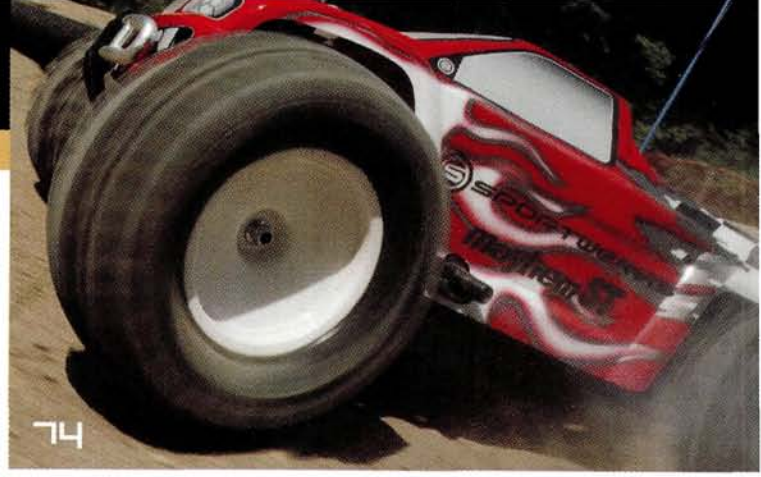
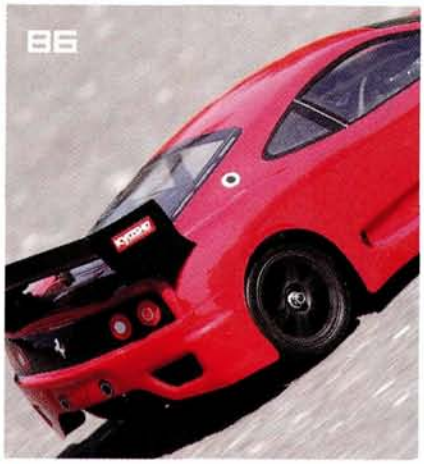


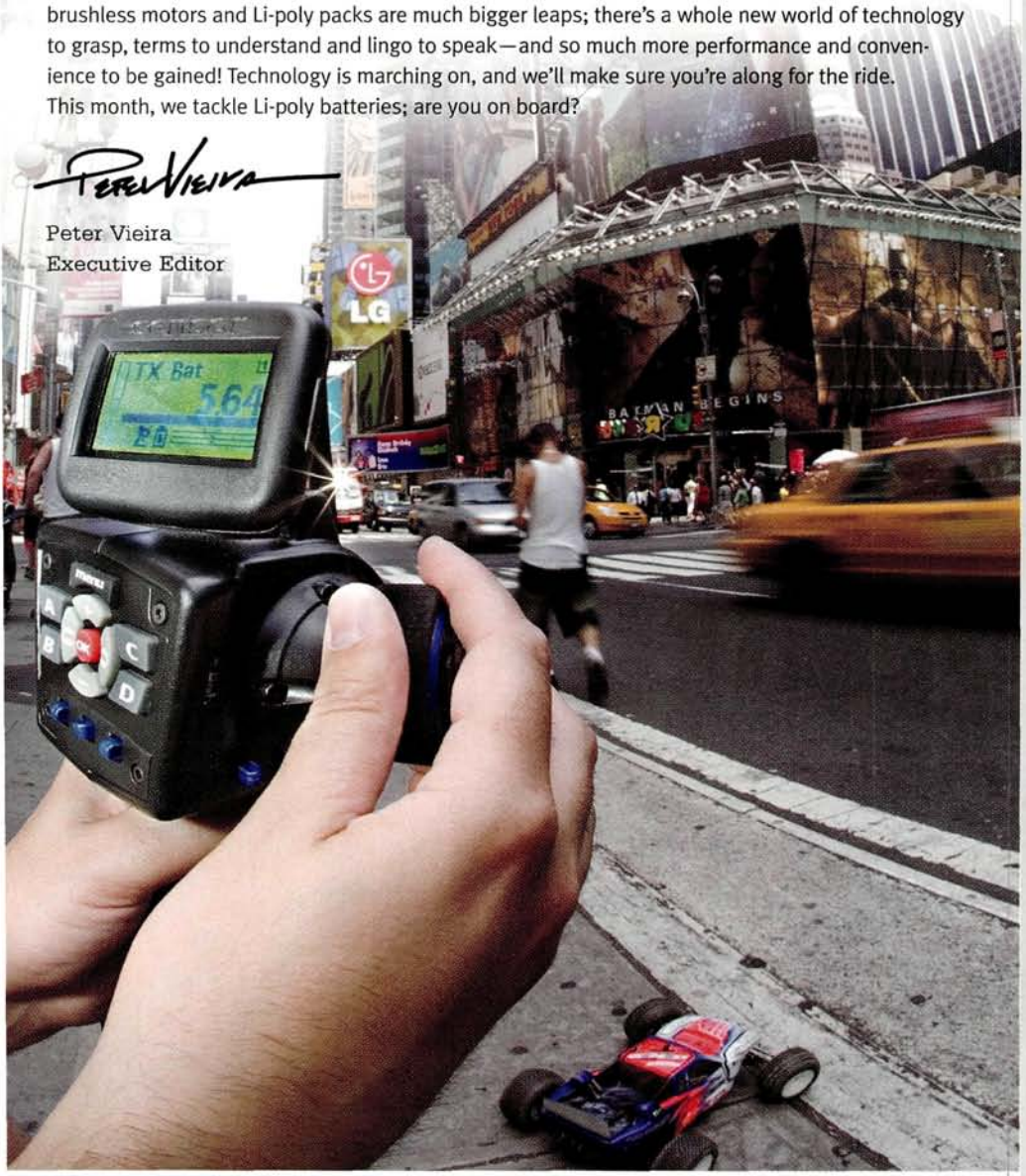


COVER STAR: Sportwerks' Mayhem ST rails the pipe. Pete Hall behind the lens.

Future shock

Admit it: you're a little freaked out by brushless motors and Li-poly batteries. You're not alone; I feel the same way! For as long as I've been involved in RC, it's been all about brushed motors and batteries that look like batteries: cylinders with a "+" on one end and a "-" on the other. I've mastered this stuff, I understand it completely and changing over to something new is a little scary. Sure, we've had new motor and battery technologies before; brushed motors have seen lots of innovations, such as flat-wire and big-brush tech from Trinity, Team Orion's comm-saving angled-brush concept and surface-mount components. On the battery side, we've seen capacity climb steadily and a shift from Ni-Cds to NiMH cells. And there's also a new boom in radio tech, as 2.4GHz systems from Nomadio and Spektrum bring new convenience to RC. But while these technologies are certainly innovative in terms of performance and function, they are highly transparent in the way they are used. The battery packs don't look different, and the charging regimen is basically unchanged. The hot new motors are still attached with two wires in the same old way, and the new super-radios feel and drive the same as the old—you just don't have to worry about which channel you're on. But brushless motors and Li-poly packs are much bigger leaps; there's a whole new world of technology to grasp, terms to understand and lingo to speak—and so much more performance and convenience to be gained! Technology is marching on, and we'll make sure you're along for the ride. This month, we tackle Li-poly batteries; are you on board?

Peter Vieira
Executive Editor



Do you hear that?

That's the sound of opportunity knocking. This is your chance to join the *RC Car Action* team! We're on the lookout for a creative, organized, detail-oriented editor to work on *RC Car Action*, *RC Nitro* and our specials and books—your basic dream job. It's a full-time position in Ridgefield, CT, and the ideal candidate has journalism or technical writing experience and RC expertise (of course). Are you the guy or gal we need? Send us your resume at resumes@airage.com!

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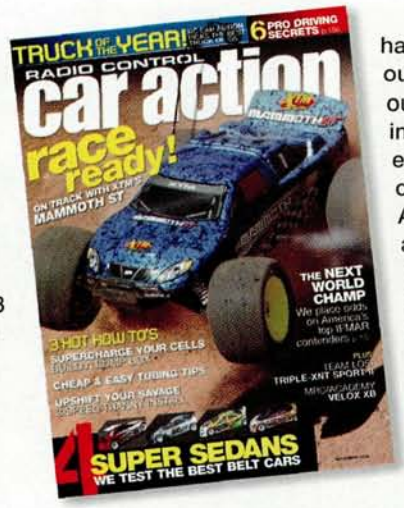
Eight-legged Mammoth?

The T-Maxx came out with 8 shocks; then the Savage and Monster GT had 8, too. Then the Revo had 4 and the LST had 4, but they're wicked big. The Mammoth started with 8 and now has 4. What is really better—4 shocks or 8? Or 10? Big or small? [email]
Anthony Moline



Four shocks are all you need as long as they are sized and sprung properly. In the RC monster truck world, I think it has been more of a fashion question: whatever looks cooler, wins. But as we move into the "performance era" of RC monster trucking, I think we'll see gimmicks give way to exclusively function-first designs.
—Pete

Go Dirt

I am about to buy my first RC car. I know I want a kit, but I don't know if I want an on-road or off-road car. I am trying to decide between the Associated TC4 RTR and the T4 RTR. I'm more into the looks of street cars than dirt cars, but I still like the idea of driving off-road. Will I really miss out if I get the TC4? [email]
Trevor

My advice is this: if you want to play in the dirt—ever—get an off-road car. You can always play on pavement with an off-road car, but an on-road car isn't much fun in the dirt. Nor is it very good for the car!
—Pete

Wingin' It

I have seen many trucks with a buggy tail on the back. Can you tell me how this is accomplished for a truck like a Revo? Does any aftermarket company make a bolt-on kit? [email]
Douglas Springer

The trucks with wings are generally converted buggies that use the factory buggy wing mounts. There's no such provision on the Revo, so you'll have to rig something if you want the wing look. Maybe that would be a good how-to ....
—Pete

Aren't You Glad You Wrote?

First of all, excellent mag. I was reading in "Troubleshooting" that Jeff Tanner had a problem with the 18T's outdrives. My 18T came with outdrive sleeves, but I had to install them, which was easy; I'm guessing he got one of the old ones. Team Associated makes blue aluminum outdrive sleeves (item no. 21243) for about $8; you get four in each package. Also, on the project "Race Revo," why didn't you put on an aerodynamically designed racing body (such as Pro-Line's new Crowd Pleazer 2.0 made specifically for the Revo). It already has a wing, and it's perfect for a racing rig. Keep up with the great work, and I look forward to seeing my letter in your mag. [email]
Sergio Mendez

First of all, great letter. You really know your stuff, and you're helping out your fellow readers, so I'm gonna help you out. Since you seem to like Pro-Line stuff, I'm sending you a full PL setup for your 18T, including a Crowd Pleazer body and Bow-Tie tires. As for Kev's Camaro body, he's basically a hillbilly, so the car-body-on-a-truck-chassis concept is all him.
—Pete

Keepin' it Revo

I have been in the hobby for a few years and bought a Traxxas Revo. After bashing it for the past couple of months, I decided that of all my vehicles, this is the one I want to upgrade. I would first like to add more power, as I feel the Revo is way under-powered for what it is. My research has shown me that the O.S. 18 is a good engine, but I want more power than that. I think I've decided on the Sirio .23 engine. It is a direct fit and comes with an exhaust. Will the .23 mill have too much power and strip my gears, or will it be fine? I know that a lot of people think a larger mill "upsets the Revo's balance," but I DON'T CARE! I want power! [email]
Codi Terrill

OK, Codi; settle down. Your Revo should handle the power as long as you don't have the slipper clutch locked down. But before you unload your wallet on a Sirio .23, are you sure your TRX 2.5 is tuned properly? There are always guys who gotta have more power, but a Revo shouldn't feel "way under-powered."
—Pete

YOU SAID IT

"Why didn't you print my letter?"

Why didn't you print my letter? [email]
James T.

Readers, here are some tips to help your letter make the cut. And James, this should give you a clue as to why your letter didn't:

1. Make an attempt to spell correctly, and please use capital letters properly. ALL CAPS IS LIKE SCREAMING; and if you use nothing but lower case, we have to peck around your letter to put all the caps in. Or we just delete the whole thing and move on.
2. Have something to say. Most letters are just requests for product info and are better dealt with by posting them on the rccaraction.com bulletin board. The best letters reveal your opinions, insights, or point of view about RC.
3. We don't do research. "Can you tell me all the prices of all the RTR monster trucks under $400 that have aluminum shocks and tell me the pros and cons of each?" No, we can't. Next!
4. Include your name! If your email address is "JohnG@aol.com, we can figure out that you're John G. But if it's something like "halomasterGX12654," then please tell us what your mom calls you. If your birth certificate really does state "Halo Master," you have our condolences.

—Pete ■

Email us at readerswrite@airage.com, or put the postman to work by mailing your letter to Readers Write, 100 East Ridge, Ridgefield CT 06877-4606 USA. Please include your city and state, and let us know if we may publish your email address. We can't reply to every letter and email, but we read 'em all!

Pro-Line Racing
Crowd Pleazer 2.0 for Traxxas Jato

This Jato is modeling Pro-Line's latest gear—a Crowd Pleazer 2.0 (molded just for Traxxas' innovative stadium machine) and the just re-released Agitator wheels. The 0.040 Lexan body includes the usual good stuff (overspray film, decals, wing and hardware), and the Agitator wheels have been beefed up around the hexes for super strength. They're a direct fit for the Jato, and they're ready for any 2.2-inch truck tire (Pro-Line Dirt Hawgs are shown). The Agitators can also be used on the Nitro Rustler and Nitro Stampede.

Pro-Line (951) 849-9781; pro-lineracing.com.

Coming Soon
RC Dirt!

We're just digging in (no pun intended) on our latest special, but we couldn't wait to tell you about it! *RC Dirt* is exclusively off-road and all about power and performance. There's lots of action with a buggy-vs.-truggy-vs.-monster-truck shootout and in-depth tests with the latest electric 4WD buggies. Helpful how-to's cover everything from suspension-setup secrets to high-performance engine tuning, and you'll find product guides, driving advice, an inside look at the pros' cars and more. It's packed! Look for it on newsstands on October 18.

>>>PIT BOX

schumacher
Alloy Camber Gauge

Here's a camber gauge that will help you dial in the angles and pimp out your pit box at the same time. Schumacher's purple aluminum unit looks stylish, but it's all business with easy-to-read engraved degree marks and a compact design.

Schumacher USA (813) 889-9691; racing-cars.com.

POWER ZONE

Team Orion
Wasp .21 Team Engine & Exhaust Kit

Orion's new Italian-made Wasp .21 Team Off-Road engine is aimed specifically at the 1/8-scale off-road buggy class. The engine has a hard-chromed, brass-lapped "5+2" port cylinder that's mated to a precision-matched CNC piston made out of billet, high-silicon alloy. Fuel is delivered through a 14mm hard-chromed, drilled and balanced crankshaft and a high-performance, composite-plastic slide carb with interchangeable 7 to 9mm venturis. The Team Orion 069 Polished Inline Exhaust kit was designed to work with the Wasp .21 Team Off-Road engine, and it comes with a manifold, manifold springs and two rubber manifold gaskets.

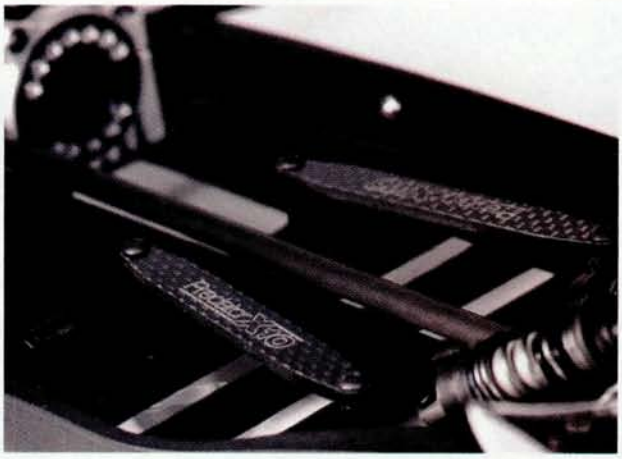
Team Orion Inc. (714) 694-2812; team-orion.com.

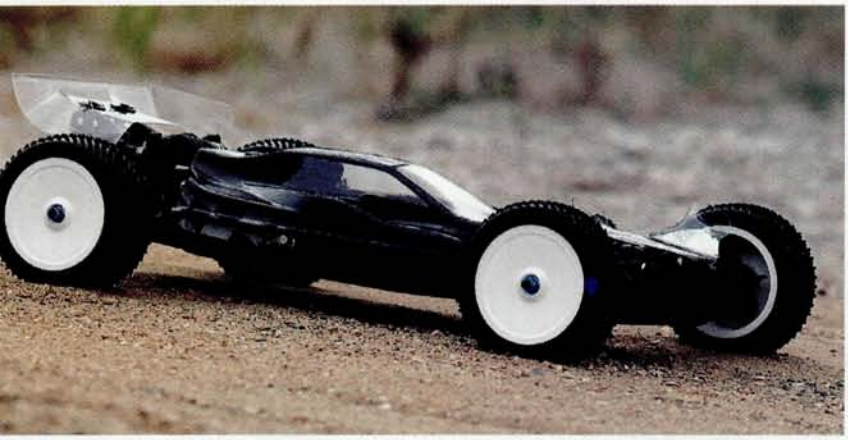
insidescoop

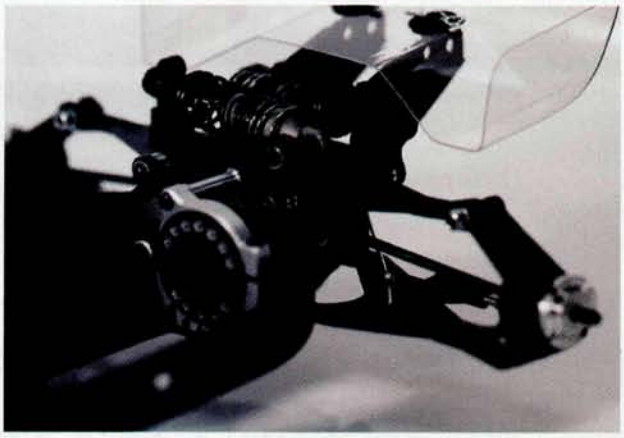
Tenth Technology
Predator X10 4WD Buggy

Back in 1993, Tenth Technology debuted its wild Predator 4WD buggy. It was highly unique; it incorporated F1-style suspension and had a central, shaft-driven drivetain—both groundbreaking features at the time. Well, Tenth Tech is set to release an updated version of the car in full race trim, and it looks like the ultimate low-CG, high-grip machine. Look for a review of this radical four-wheeler in a future issue.

Tenth Technology; ttechracing.com.







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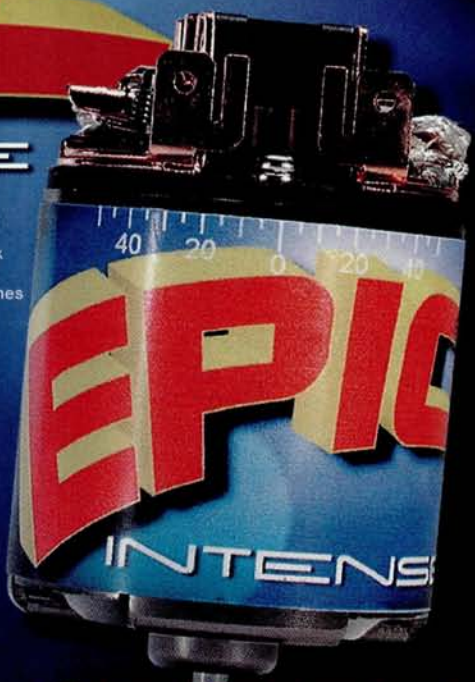

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Venom Racing
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Venom's new High-Voltage 1200mAh NiMH 2/3A cells are perfect for building your own receiver battery packs, flight packs and micro packs.

Venom HV-1200mAh batteries are perfect for power-hungry electric motors and digital servos. Each cell comes ready for assembly with welded connector tabs.

Venom Racing (800) 705-0620; venom-racing.com.

Pro-Line
California Cruiser for Maxx, Revo & Savage

How about Pro-Line's new California Cruiser? Pretty cool, huh? Its 1930s-style lines embody the spirit of the classic Cali surfing scene. The shell is made of super-thick 0.060 Lexan with overspray film, and woodgrain decals are included.

Pro-Line (951) 849-9781; pro-lineracing.com.

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XRAY
XB8 Raycer

The Raycer is the "budget" version of XRAY's big-dog XB8, but it sure seems like a pro-spec buggy to us. Just like the top-of-the-line car, it has Hudy spring-steel drivetrain parts, degreased and oiled bearings with rubber seals and a 7075 aluminum chassis and shock towers (but in silver instead of hard black). The Raycer is as adjustable as the XB8 and includes XRAY's signature Integrated Adjustable Caster (IAC) and Integrated Suspension Settings (ISS) systems.

XRAY Products; distributed by XRAY USA; contact RC America (800) 519-RCA1; teamxray.com.

>>>PIT BOX

schumacher
TRIX TOOLS

The tips are precision-machined and hardened steel (would you expect anything less?), but it's all about the handles. They're larger in diameter to help you remove stubborn screws more easily and to reduce hand fatigue during serious wrenching sessions. The handles also have flat sides, so they won't roll off your pit table, and they havecolor-coded end buttons for quick size ID.

Schumacher USA (813) 889-9691; racing-cars.com.

POWER ZONE

Racers Edge
SURE FIRE .32

Talk about going big! This new Racers Edge .32-cubic-inch (5.2cc) engine is huge! It comes with a pull-start and a non-pull-start backplate to easily convert it for bump starting (aftermarket shaft-start systems are also compatible). A composite-plastic carb and ABC construction are standard, and the flat-black anodized finish looks killer.

Racers Edge (866) 855-5566; racers-edge.com.

inside scoop

HPI Racing
Shelby GT-350

The 1965 Shelby GT-350 was tweaked by the legendary Carroll Shelby for extra horsepower; it had improved suspension, performance-inspired body mods, distinctive paint and special Goodyear Blue Dot tires. HPI has captured every detail from the classic Shelby 'Stang right down to the Blue Dot tire decals. This 1/10-scale replica fits most 200mm touring cars.
HPI Racing (949) 753-1099; hpiracing.com.

Tamiya
TRF415 & TB Evo IV Spools

Tamiya now offers these Front Direct Couplings (better knows as solid spools, if you don't speak Tamiya) for the belt-driven TRF415 and the shaft-driven TB Evolution IV. Both kits include the Front Direct Couplings, cup joints and stainless-steel shafts.
Tamiya America Inc. (800) 826-4922; tamiyausa.com.

HOT RUBBER

Pro-Line
Crime Fighter MT & Moab 2.2

Pro-Line's Crime Fighter tires have netted the company many national championships and an IFMAR World Championship, and now they're available in standard Maxx size. They offer crazy side bite, thanks to the staggered pins and elongated, diamond-shaped center tread. Their narrow carcass is 15 percent narrower than the Bow Tie MT's, and it's made of a supersoft M2 compound.

The Moab 2.2 for 1/10-scale trucks is huge—5 inches tall and 2.25 inches wide! Its huge contact patch with an aggressive, realistic tread pattern makes for a great backyard basher tire. The tire diameter gives you an additional 1/2-inch of ground clearance over standard 2.2-inch tires.
Pro-Line (951) 849-9781; pro-lineracing.com.

Traxxas
Tubes Suspension Links for Revo

Add a little style to your Traxxas Revo with these new aluminum turnbuckle Tubes. They're 30 percent lighter than the stock steel pieces, and Traxxas tells us that they're four times stiffer and more than double the strength of titanium turnbuckles. Sounds pretty crazy, doesn't it? According to Traxxas, the secret is in the unique patent-pending tube design that maximizes stiffness and resistance to being bent while reducing weight. Tubes are made out of 7075-T6 aluminum and anodized red. A metric aluminum wrench is included for making adjustments.
Traxxas (972) 265-8000; traxxas.com.

parma
X-citer, Monster Trash & Custom Coupe shells

Parma has a whole slew of new bodies for cars and trucks. Check out the X-Citer for the HPI Savage and 1/8-scale truggies. The truck bodies are made of 0.050-inch-thick Lexan for durability. There's also a cool X-Citer 1/18 buggy body, a sweet-looking Monster Trash Truck and this badass 37 Custom Coupe. All the bodies come with detailed decal sheets and window masks.

Parma/PSE (440) 237-8650; parmapse.com.

schumacher
waterproof fail-safe

Schumacher's new fail-safe is super-small: it measures only 29x26x6mm and weighs only 8 grams. It comes with a pushbutton setup, dual operation LEDs and a low-voltage setting for 4- or 5-cell receiver packs; it also has "fuzzy logic" micro-control for glitch-free operation.

Schumacher USA (813) 889-9691; racing-cars.com.

Team Losi
QC wheel adapters

If you run an Adam Drake 2 and a Triple-XT every Sunday, these are for you. Losi's new adapters let you run the Drake wheels on your electric truck, so you need to keep only one style of wheel in your gear bag—no more "fronts" or "rears." The hard-anodized aluminum adapters are sold in pairs with the required nuts, and you can also get the special nuts separately.

Team Losi; distributed by Horizon Hobby Inc. (800) 338-4639; teamlosi.com; horizonhobby.com.

Tamiya
TT-01R chassis kit

This "semi-tuned" version of the TT-01 was designed as an entry-level chassis for those who want to compete without spending a ton of dough. The hop-up list includes adjustable upper arms, toe-in rear uprights, aluminum CVA mini-shocks, full ball bearings and a lightweight aluminum main shaft.

Tamiya America Inc.
(800) 826–4492; tamiyausa.com. ■

[READERS' RIDES]

BY PAUL ONORATO

YOUR BEST BUILDS

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reader's ride
OF THE MONTH

Jeffrey Kerner › League City, TX

Traxxas Stadium Maxx

We received a bunch of photographs showing Jeffrey's awesome customized Traxxas Stadium Maxx and T-Maxx monster trucks. Shown here is his all-chrome Stadium Maxx. He paid close attention to aesthetics so that his tricked-out truck would not be loaded with 10 different colors. He used a Team Integy aluminum skeleton, American CNC skidplates, a Robinson Racing clutch and flywheel, MIP CVDs, GPM springs and engine mount, custom aluminum shocks, RPM wheels, Pro-Line tires and Lunsford titanium turnbuckles. A Trinity/Sirio .23 engine with a Hot Bodies aluminum tuned pipe powers the truck.

The 'Cuda's incredible Stars and Stripes paint scheme was laid down by Phatbodies.

Bill Shelton › Coeur D'Alene, ID

Team Associated RC10 GT

Bill is a longtime reader who at last decided to send us a picture of one of his trucks. This RC10 GT is one of 11 vehicles in his RC arsenal. It features a very powerful O.S. .12 CV-R engine, a JR Racing computer radio system, Progressive Suspension shock reservoirs, RPM suspension arms, Robinson Racing gears and slipper clutch and a host of Trinity, blue-anodized aluminum upgrades, and it rolls on Pro-Line wheels and tires.

Chris Russell › Indianapolis, IN

HPI Micro RS4

Here is one of the nicest-looking Micro RS4s we've seen in a long time. Chris created an X-Men-Mystique paint scheme on a Bud's GTP body using XXX-Main picture glue and then backing it with paint. Under the sweet shell is a Motek Racing EXO2 chassis, a front one-way and a rear ball diff, Trinity GP1100 batteries, a Mamba competition brushless motor system and Team Orion tires. Bud loves to race at his local carpet track, but he hasn't yet run with his new X-Men body because he doesn't want to risk damaging it; we don't blame him!

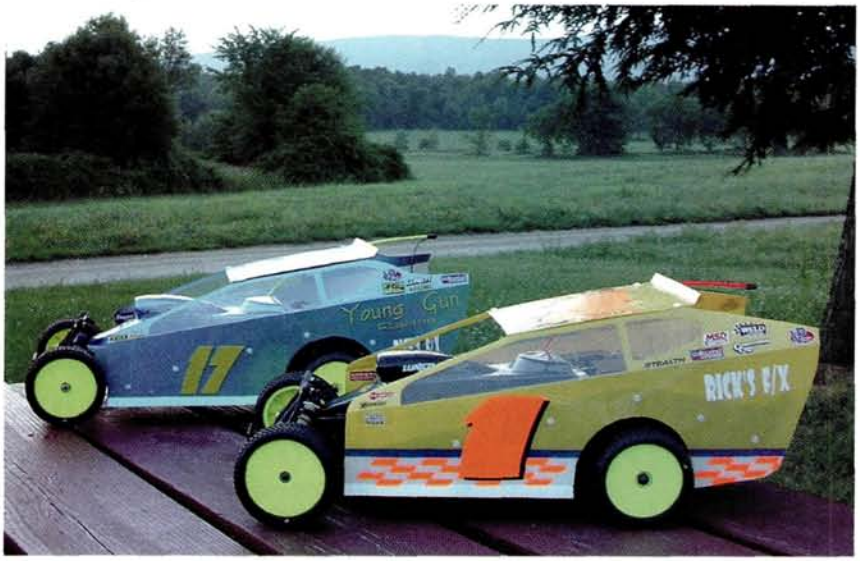
SEE YOUR RIDE IN READERS' RIDES AND WIN NOVAK GEAR!

If we feature your vehicle in Readers' Rides, you win a one-year subscription (or renewal) to *RC Car Action*. Reader's Ride of the Month wins a Novak battery pack, and Reader's Ride of the Year wins a Novak brushless motor system! Email your 300dpi TIFF or JPEG images to readersrides@airage.com, or send color prints and a description to Readers' Rides, RC Car Action, 100 East Ridge, Ridgefield CT 06877-4606 USA. Be sure to write your name, address and phone number on the back of each photo and on your letter. Submissions will not be returned.

Rob Nestor › Thompson Ridge, NY

Team Associated RC10 B4 RTR and Factory Team

This father-and-son team love to get it done in the dirt with their two modified Associated B4 buggies. They modified two McAllister dirt-oval bodies to fit the B4 chassis, and Pro-Line wheels and tires take care of the traction detail. Son Keith (car no. 17) uses an LRP ESC and a Trinity 17-turn mod motor, and Rob (car no. 1) installed a Novak ESC and a Trinity Monster Pro stock motor in his Factory Team kit.



Chuck Lentz › Latrobe, PA

Team Associated Factory Team RC10 B4s

Chuck solved his problem of not being able to race when the weather is bad by building a second B4 just for carpet racing. It's spec'd with Trinity TRC foam tires, and he can race whenever he wants. The buggies have different ESCs: the blue carpet car has a Novak GT7 and the fluorescent off-roader uses a Novak GTX. Both buggies are set up with Trinity P2k Pro motors, Novak XXL receivers, Futaba S9451 steering servos, Pro-Match GP3300 cells, Lunsford turnbuckles and hingepins, Robinson Racing titanium ball ends and RPM ball cups, front bumpers and gear covers.

POWER UP YOUR RTR!

#700 Reedy "Rated-X" Sport Pack, GP 3300 cells

ONLY $64.99 Suggested Retail Price

Reedy "Spec 19 Quad-Mag Motor. Step up the power of your RTR with Reedy's Quad-Magnet "Spec 19" Motor! A great choice for the B4 RTR, the TC3 RTR, or any Ready-to-Run electric with a speed control rated for a 19-turn or less motor.
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#699 Reedy "Rated-X" Sport Pack, Panasonic 3000 cells

Reedy Ni-MH Receiver Packs for Nitro Cars and Trucks. Reedy receiver packs give you the long-lasting, reliable power needed for nitro racing, and have a great low price that makes them your BEST choice!

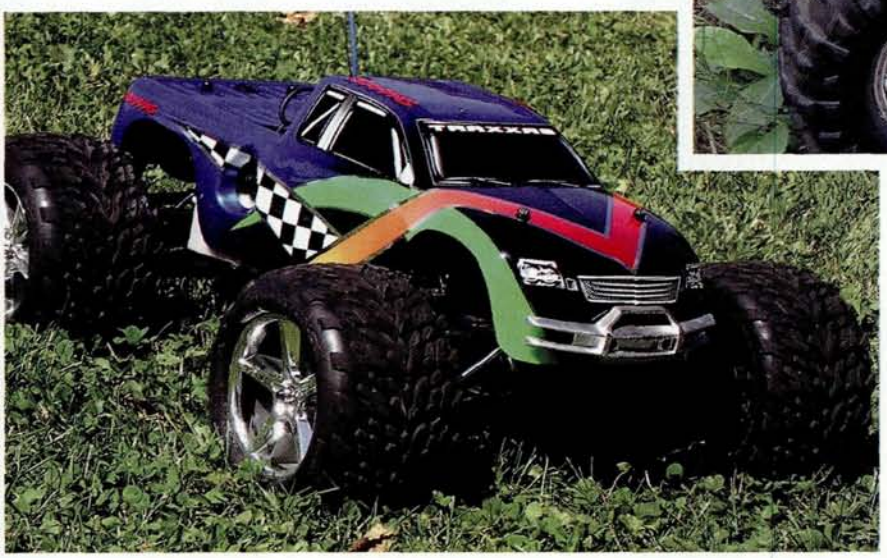
#615 Reedy Ni-MH Receiver Pack, (Hump style for RC10GT, Monster GT, Etc.)

#614 Reedy Ni-MH Receiver pack, (Flat style for Nitro TC3, etc.)

Rob Sellin › East Pittsburgh, PA

Team Losi LST

Losi's badass LST monster truck is the latest addition to Rob's collection of RC vehicles. He tells us that it is quickly becoming one of his favorite rides. So far, he has added RPM front and rear suspension arms, a Lunsford titanium upgrade kit, a Motor Saver air filter, a Dynamite in-line fuel filter, Losi skidplates, a 2-speed gear conversion, a swaybar kit and a performance brake upgrade.



Matt Brase › Waverly, IA

Traxxas Revo

Matt race-prepped his Revo to reduce his lap times. He added RD Racing Quickturn driveshafts to improve cornering speed and RD's aluminum servo-saver mount that's designed to clear the new shafts. He installed a Traxxas, forward-only conversion kit, and the well-executed paint job is the work of his father. Good luck at the track! ■

Mini-MAX

Reedy Hop-Ups for Micros!

ONLY $42.99 Suggested Retail Price

Reedy Mini-Max High-Voltage 1100 Ni-Mh Racing Battery Pack. Higher voltage means more power and that's just what you get with Reedy's new Mini-Max 1100s. Featuring much higher voltage output than stock battery packs the Mini-Max HV 1100 pack is the ticket to making your micro car rip up the road. Comes completely factory assembled with connector and fits directly into the RC18T!
#616 Reedy Mini-Max 1100 Ni-Mh Battery Pack

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Reedy Mini-Max Modified Motor. Seriously turn up the heat in your micro with the Reedy Mini-Max Mod Motor. Big time features like ball bearings and replaceable brushes are shrunk down to the popular 280-size to fit most 1:18 vehicles, especially the RC18T.
#290 Reedy Mini-Max Modified Motor

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[PIT TIPS]

BY GEORGE M. GONZALEZ › ART BY RICHARD THOMPSON

OUR TIPS › YOUR TIPS › PRO TIPS

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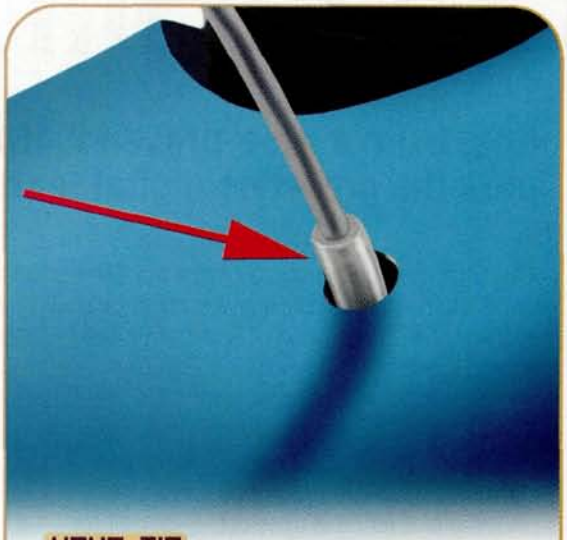
PRO TIP

Zip-tie fuel-tank loop

› Team Associated factory pilot Barry Baker

Many racers attach zip-ties to the fuel-tank lid to make refueling easier. The best way to make a handle is to attach a zip-tie to the tank so it forms an easy-to-grab loop. Slide the ends of the zip-tie through a small piece of fuel tubing to hold the loop in place.



YOUR TIP

Tougher antenna

Samuel Daigle › Quebec, Canada

If your antenna always splits or cracks where it exits the hole in the body, slide a piece of fuel tubing over it, and push it through the hole in the body. The tubing acts as a bushing to protect the antenna from the sharp Lexan.

YOUR TIP

Homemade drift tires

Sheldon Wong › San Francisco, CA

You can make drift tires by using PVC pipe that's the same diameter as your touring car's rims. Cut the PVC pieces to the same width as the wheels with a hacksaw, and glue them to the rims. PVC is available in black and gray, so you can mix and match.

Hang 'em high

If you store your vehicle on a flat surface for an extended period, the tires may develop flat spots, and that can potentially ruin them. Hang your cars on a pegboard instead. It will take the weight off the tires and make your workshop look organized, too.

Easier HPI drift-car refueling

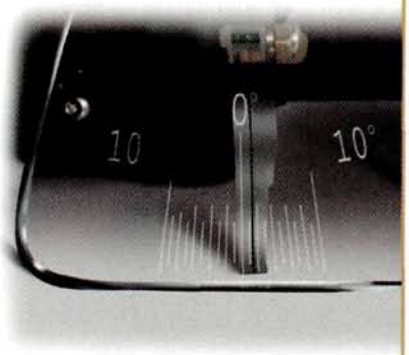
If you have an HPI Nitro 3 Evo with the Stage D drift conversion, you know that refueling can be difficult with the tank positioned toward the back of the vehicle. Make an access hole for the tip of the fuel bottle through the top of the roof and a smaller hole through the back window. Attach a zip-tie handle to the fuel tank's lid, and route it through the hole in the rear window. Now you can pull the zip-tie to open the fuel tank lid and refuel the car without removing the body.

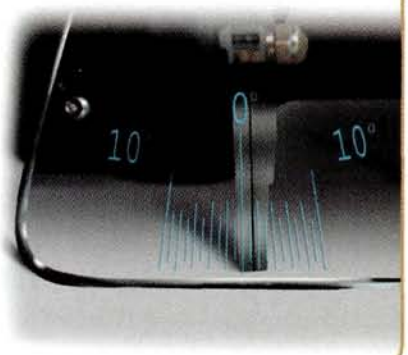
YOUR TIP

Easy-to-read setup gradations

Andy Parks › email

Having a hard time seeing the gradations on setup systems that have white backgrounds? Use a dry erase marker to fill in the etched lines. Wait a few seconds for the ink to dry, and then wipe the surface of the tool with a rag. This will leave colored lines that stand out much better against the white setup board.





YOUR TIP

Super-secure wing

Billy Zaro › Brooklyn, NY

Most truck kits come with wings attached to the bed with servo tape. Servo tape works OK, but you can attach the wing more securely with Pacers Zap-a-Dap-a-Goo. Apply the glue to the wing, and stick it in place. The wing will stay on no matter what.

YOUR TIP

Toenail-clipper tire trimmer

Steve Mainsted › Las Vegas, NV

A toenail clipper works great for trimming the knobs on off-road tires. The clippers allow you to easily and accurately trim them to size and to remove them completely.

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If we publish your tip, you'll win a 6-month subscription (or extension) and a chance to win the "Tip of the Year" grand prize: an OFNA RTR. Email your tips to GeorgeG@airage.com. Include a photo or scan a sketch if you can. Snail mail? Write to Pit Tips, 100 East Ridge, Ridgefield, CT 06877-4606 USA. Be sure to write your name, address and phone number on each tip you submit.

We screen all Pit Tips for functionality, feasibility and safety but do not test them. *RC Car Action* is not responsible if you mess up your gear or yourself by using the tips given here. If you aren't comfortable following any tip we show—DON'T!

TROUBLESHOOTING

BY GEORGE M. GONZALEZ

YOU'VE GOT PROBLEMS › WE'VE GOT FIXES

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ROBINSON RACING PRODUCTS

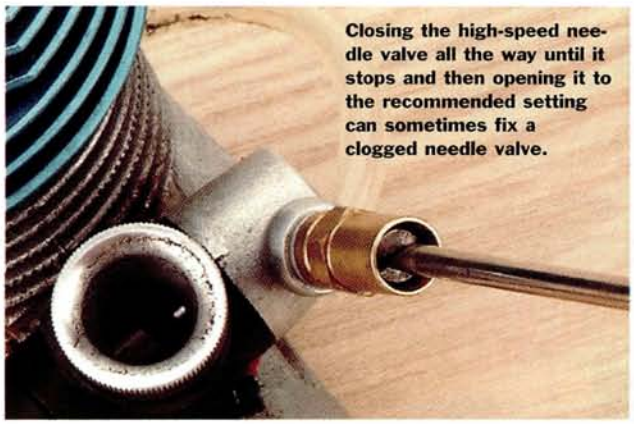
Clogged high-speed needle valve. I have a Trinity Nitro Spyder.

Q The truck ran great right out of the box, and I have been running it at a dry field next to my house for weeks. I tried to start the truck the other day, and the engine would not fire up. I changed the glow plug, just in case, but it still will not crank over. I removed the air filter, and that's when I noticed that fuel is not entering the carb, even when I block the exhaust tip to prime it. I checked the fuel line and it looks fine. I'm baffled and can use some help.

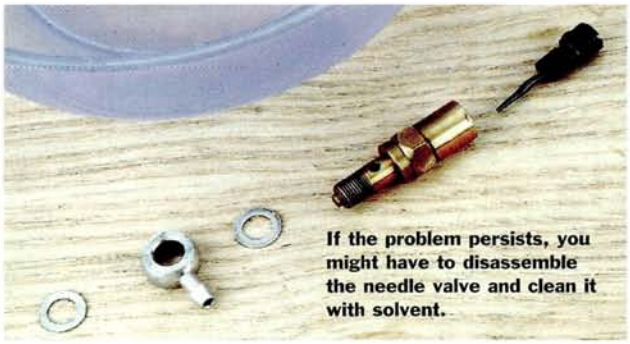
Richard Cummings
Parma, OH

A It sounds as if your high-end needle valve is clogged. You might have to remove it and clean it, but you might be able to clear it without disassembly. Close the mixture screw by turning it clockwise all the way until it stops. Keep track of how many turns it takes to do this. Then open it by turning it counterclockwise the same number of turns. Sometimes, closing the mixture screw all the way down and opening it will get the fuel flowing, but if that doesn't work, you will have to remove the high-speed needle-valve assembly from the carb and clean it thoroughly.

Remove the needle valve from the carb by loosening it with a 6mm wrench. Put the fuel pick-up aside, and then remove the mixture screw by turning it counterclockwise. Be careful not to lose the small O-ring that's attached to the mixture screw. Clean all the parts in solvent, and then wipe them with a clean rag or paper towel. Next, attach a piece of fuel line to the fuel pick-up and blow through the tube. Finally, rebuild the needle valve and reattach it to the carb. To adjust the mixture screw, close it all the way by tuning it clockwise and then open it the same number of turns as before. Install the fuel line and an in-line fuel filter, and you won't have to take your carb apart as often.



Closing the high-speed needle valve all the way until it stops and then opening it to the recommended setting can sometimes fix a clogged needle valve.



If the problem persists, you might have to disassemble the needle valve and clean it with solvent.

TNX spur-gear shredder

Q I'm having a problem with my Tamiya TNX monster truck. For some reason, after three or four tanks of fuel, the spur gears are stripped. The truck has fixed engine mounts, so there's no way to adjust the gear mesh. I tried running the slipper clutch tight and then loose, but the spur gear ends up stripped no matter how I set the slipper clutch. Do you know why this is happening and, more important, do you have a fix for it?

Cecil Martinez
Los Angeles, CA

A Even though the engine mounts are fixed, you can make subtle gear-mesh adjustments by loosening the four screws that secure the engine on the mount and then moving the engine inward to provide a tighter clutch-bell/spur-gear mesh. You can also loosen the four screws that secure the transmission to the chassis and move the tranny over a little to provide a tighter mesh. I found that initially setting a car up with a tight (but not binding) gear mesh allows the spur gear to wear in properly, and that prevents the spur gear from being stripped.

QUICKQUESTION

I'd like to build my own micro packs for my Mini-T, but the only battery bars I can find are designed for sub-C cells. Does anyone make battery bars for smaller, 1100 NiMH cells?

Team Orion offers Mini Copper Battery Bones (item no. 40118; $2.50) for building your own micro packs. Go to teamorion.com.

Left: loosen the screws that secure the engine to the engine mount, and then move the engine inwards slightly while you tighten the screws. This will provide a tighter gear mesh.

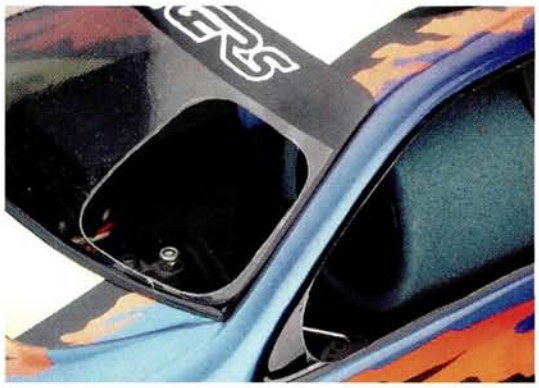
Right: you can also adjust gear mesh by slightly repositioning the transmission. Loosen the four screws that secure it to the chassis, and push it towards the outside of the chassis while you crank down on the screws.

Overheating Revo

Q I have a two-month-old Revo that runs strong, but lately, it has been running hot. I change the air filter every hour or so, and I adjusted the shift point so that it shifts a little faster. The needle valves are set to the stock settings, and I have not touched them. Basically, the truck is stock, and I haven't done anything to it. Is there anything I can do to make the engine run cooler? [Email] *Seth Matheson*

A Cut a hole in the front windshield to allow cool air to reach the engine. You can also cut out the driver's-side window for additional cooling. Check the O-ring on the fuel-tank cap for damage. A damaged O-ring can allow an air leak to lean out the air/fuel mixture. You mentioned that you have not touched the low- and high-speed needle valves. Richen the high-speed needle valve by turning the adjustment screw ¼ turn counterclockwise. Run the truck around for a few minutes, and then check the engine temperature. Ideally, you want it to run at between 220 and 250 degrees.

Once you have the high-speed needle set, check the low-speed needle-valve setting by pinching the fuel line a few inches away from the fuel pick-up on the carb. It should take approximately 3 seconds for the engine to start to rev up, and then it will stall. If it starts to rev up any sooner, it is set too lean, and you should richen the mixture by turning the adjustment screw ⅛ turn counterclockwise. Rev the engine a few times, and let it go back to a steady idle before you pinch the fuel line to check it again. You'll probably have to increase the idle speed slightly to compensate for the richer setting. Follow these tips and your engine should run cooler.



Cut a hole on the front windshield and the left window to allow more cooling air to reach the engine.

If the engine continues to run hot, richen the high-speed needle valve by turning the adjustment screw counterclockwise.

Traxxas Revo Hardened Steel Spur and Clutchbell

NEW

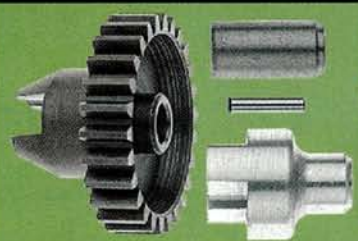
Traxxas Revo 2.5 Extra-Hard Steel Combo Includes Precision Machined 40T Spur / 16T Clutchbell, and 3 Lock Washers. RRP 8040.

T-Maxx/2.5-Maxx Lightened Spur And Double-Disc™ Slipper Kit

RRP's line of Lightened Spur and Double-Disc Slipper Kits for Traxxas Nitro and T/E-Maxx/2.5-Maxx trucks are designed to improve performance and increase reliability. This combo incorporates a machined steel or Super-Tough plastic spur, a Vented Aluminum Clutch-Plate/Gear Adaptor, 2 Slipper Pads and 2 Plates to deliver the adjustability you need and the increased performance that you demand. Complete Slipper Kits are available in the following sizes:
RRP 8166 Slipper Kit with 66T Super-Tough plastic spur (Stock Size) for E-Maxx.
RRP 8172 Slipper Kit with 72T Super-Tough plastic spur for Traxxas Nitro.
RRP 8465 Slipper Kit with 65T Steel Spur for Traxxas Nitro.
RRP 8472 Slipper Kit with 72T Steel Spur (Stock Size) for T-Maxx.
Spurs, Clutch-Plate/Gear Adaptor and Slipper Pads also sold separately.

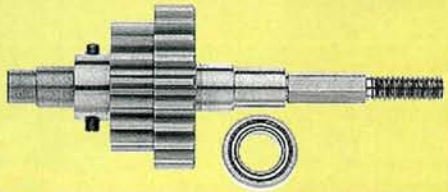
PERFORMANCE FROM ROBINSON RACING!

T-Maxx/2.5-Maxx FORWARD ONLY Steel Gear Kit



This kit contains a 26T hardened steel output gear, a forward drive hub adaptor, steel spacer and Pin. RRP 8586.

T-Maxx/2.5-Maxx Steel Top Shaft



This precision machined hardened steel top shaft will fit all T-Maxx. Includes oversize ball bearing. RRP 8525.

www.robinsonracing.com

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Rustler steering problem

Q I just bought a Traxxas Rustler to get started in RC. The truck runs great, but for some reason, it turns to the right more than to the left. I adjusted the steering-trim knob to center the servo, but it still veers to the right. Is there anything I can do, or do I have to buy a new steering servo?
Alex Marquez
Tampa, FL

A Try re-centering the servo-saver on the servo. To do this, remove the servo-saver by loosening the screw that secures it to the servo. Adjust the steering-trim knob to the center position, and replace the servo-saver on the servo so that it's in the center. You'll probably have to adjust the turnbuckles so that the wheels point straight ahead after you've centered the servo-saver. This should provide equal steering throw in both directions.

Above: center the servo-saver on the servo as shown ...

Right: ... adjust the length of the turnbuckles so that the wheels point straight ahead. Follow these tips, and your truck should steer equally to the right and left.

QUICKQUESTION

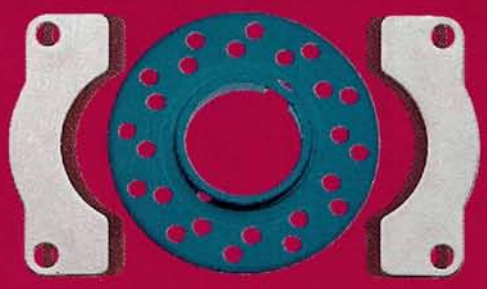
I'd like to install the CEN 4WS kit in my Genesis. Which additional items will I need to complete the installation, and will the stock radio work with the 4WS system?

The CEN 4WS kit includes everything you need to complete the installation, including a servo and a Y-connector for plugging both servos into the receiver. The stock radio will work just fine.

T/E-Maxx/2.5-Maxx Steel Diff Gear Set

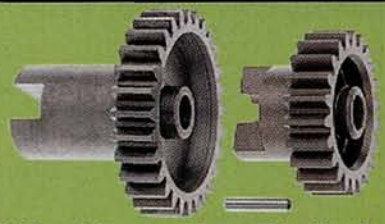
T/E-Maxx/2.5-Maxx differential gear set, includes: 1 beveled pinion gear, 1 beveled spur gear, 4 re-usable stainless steel phillips head screws, 1 tube Associated Black Grease, and a shim kit for spider gears with 10 .003" shims. RRP 8590.

T-Maxx/2.5-Maxx Aluminum High Performance Brake Kit



This lightweight aluminum high performance brake kit, includes bigger, more aggressive brake pads and steel backing plates. One piece vented rotor minimizes side-to-side wobble. Also fits newer T-Maxx. RRP 8562.

T-Maxx/2.5-Maxx Forward Primary & Reverse Gears



This kit contains a precision machined hardened steel primary forward gear, a hardened aluminum reverse gear and steel pin. RRP 8521.

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A wide range of spurs fit our Double-Disc Slipper Kits. Choose from machined Super-Tough plastic spurs in 66, 68, 70, 72, 74 and 76T sizes, RRP 82XX, or CNC machined steel spurs available in 65 and 72T sizes, RRP 83XX.
Small Clutch Plate/Gear Adaptor fits 65 thru 70T spurs.
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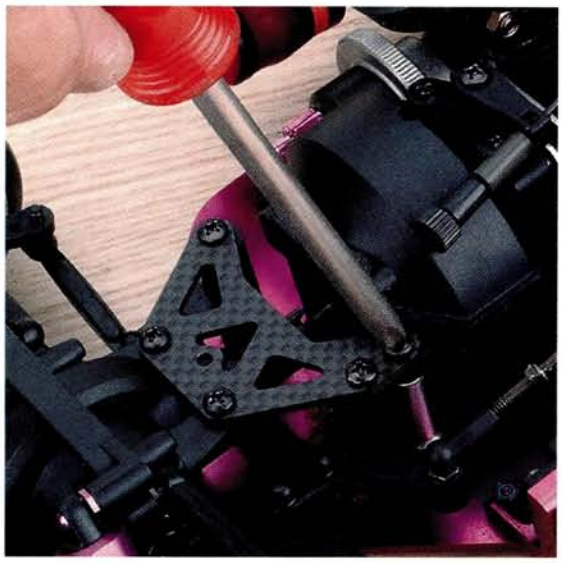
Pulling to one side

Q I have an HPI Nitro RS4 RTR 3 that pulls to the right when I hit the gas full throttle. This makes driving it very difficult. I've checked for damage to the suspension, but everything looks OK. I haven't run the car into anything either. I'm not sure what's causing this, so I'm running my problem by the experts. What do you think is causing this problem? [Email]
Derek Paulson

A The most common reasons behind any car's pulling to one direction or the other while accelerating is binding that slows the rotation of one or more of the wheels. A damaged bearing, a bent dogbone or universal axle, bent hingepins or shocks shafts, or a damaged or improperly set differential can cause a car to pull to one side during hard acceleration. Check the suspension components for binding and any obvious damage; inspect the wheel-hub bearings to make sure they spin freely; check the dogbones, axles, hingepins and shock shafts to make sure that none of these are bent. Make sure the diffs are not notchy or locked up.

Another common source of your problem is chassis tweak: the upper deck or the chassis is twisted slightly. To fix this, loosen every screw that secures the upper deck to the bulkheads just enough for the upper deck to be moved slightly. Let the upper deck and chassis sit for several minutes and settle into their original shape before you tighten the screws back up. This should remove most, if not all, of the car's tweak.

Other potential causes are having shocks of unequal lengths and allowing the wheels to rub the body. Check the shocks' lengths with calipers and make sure that the two front shocks and the two rear shocks are the same lengths. If necessary, adjust shock length by tightening or loosening the shock-shaft rod ends. Check the body for signs of wheel rub. If the paint is worn away above the wheel openings, your tires are rubbing the body. Raise the body or enlarge the wheel openings.



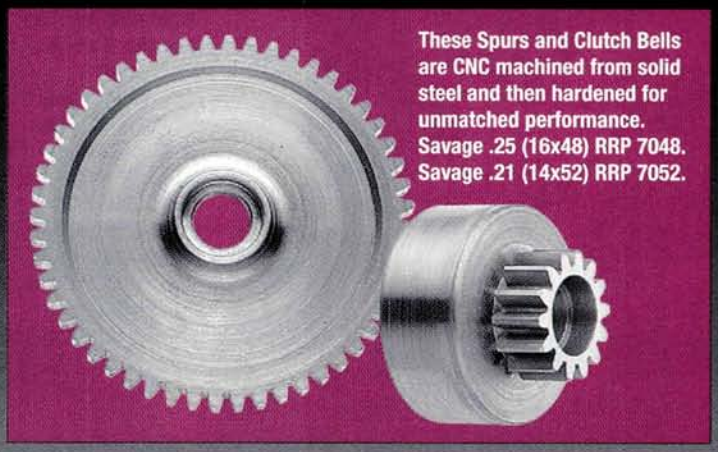
Above: loosen the upper deck screws, and let the parts settle for a few minutes before you retighten them. This will usually fix chassis tweak.

Left: a messed-up wheel bearing can bind the drivetrain and make the car pull to one side or the other while it's accelerating. Check the bearings by sliding them over a pencil. Spin the bearings to make sure they operate freely and are not damaged or dirty.

RC10-GT Hardened Steel Idler Gear

Cut from solid steel stock, this RC10-GT gear is lightened and hardened for super quiet precision and extra long life. Black tranny grease included. RRP 2213.

HPI Savage .21/.25 Nitro Steel Combos



These Spurs and Clutch Bells are CNC machined from solid steel and then hardened for unmatched performance. Savage .25 (16x48) RRP 7048. Savage .21 (14x52) RRP 7052.

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Hardened Aluminum Mini Pinions

NEW

NEW For Associated RC18T .5 mod Lightweight Hardened Aluminum Mini Pinion, Available In 12T Thru 18T. RRP 16XX.

DON'T SETTLE FOR SECOND BEST!

RC10-GT Steel Combo

Precision machined from solid steel, then hardened, this 65T spur and 15T bell combo will last and last. RRP 2365.

Hardened Diff Gear

Hard anodized, precision CNC machined aluminum diff gear. RC10-GT RRP 1513. Losi XXX NT RRP 9500.

RR

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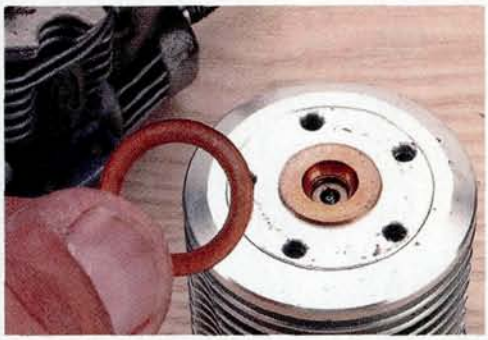
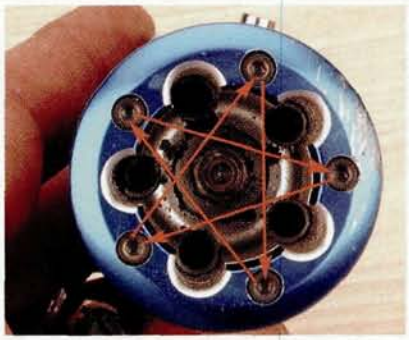
Missing head shim

Q I have a T-Maxx and decided to install an aftermarket cooling head to keep engine temps lower. I have not been able to start my truck since I installed it. The carb is getting fuel, and the engine pops as if it wants to start, but it never cranks over. I replaced the glow plug just in case, but that didn't help. Did I screw up my engine?
Jim Cruse
Evansville, IN

A Did you remember to install the head shim on the new cooling head, Jim? Perhaps it is still stuck on the stock head. The engine requires at least one head shim to provide the proper compression to keep the engine running. You'll have remove the cooling head to install the shim. Be sure to tighten the screws that secure the cooling head to the engine in a "criss-cross" pattern to ensure that they're all evenly tightened. Tighten one screw slightly, and then tighten the screw that's diagonally across from it by the same amount. Work your way around the screws until they're all tight.



The TRX 2.5 engine requires at least one head shim to operate properly. Install the shim on the cooling head before you install the head on the engine.



Follow a criss-cross pattern when you tighten the cooling-head mounting screws to ensure that they're all equally tight.

TOOLBOX

Tamiya
turnbuckle wrench

If you own a car with turnbuckles, a decent turnbuckle wrench is a must-have. Tamiya makes this blue-anodized aluminum wrench with a textured, nonslip handle and jaws that are 4.2mm wide and make it possible to adjust turnbuckles down to 3mm. This wrench is also perfect for removing shocks and other linkages that have similar eyelets. The jaws of the wrench slide onto the shock eyelet just below the ball stud, and it's easy to pry the shock off the chassis without damaging any of the parts.

Tamiya turnbuckle wrench—53602; $8. Tamiya America Inc. (800) 826-4922; tamiyausa.com.

NEED HELP?

Send your "Troubleshooting" questions and comments to troubleshooting@airage.com, or mail them to "Troubleshooting" c/o *RC Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606 USA.

HPI Savage .25 3-Shoe Vented Flywheel

NEW

The Savage .25 3-Shoe flywheel is precision CNC machined from 7075 aluminum and vented for increased airflow. RRP 7005. (.21 Pull-Start 2-Shoe version RRP-7000.)

T-Maxx/2.5-Maxx Hardened Steel Clutchbells

CNC Machined from solid steel these bells are built to last. They take the 5x11 bearing (NOT included). Available in 19T, RRP 8119, 20T RRP 8120, 21T RRP 8121 and 23T RRP 8123.

48P Absolute Series Pinions

Super hard, lightened and cut with superb precision. Runs great with any 48P spur! Available In 48P in 16T thru 28T sizes. RRP 1416 - RRP 1428.

HPI Savage .21 Extra Hard Steel Clutchbells

These Clutch Bells are CNC machined from solid steel and then hardened for unmatched performance and durability. Available in 14T, 16T and 18T. RRP 70XX.

48P / 64P SuperLite Aluminum Pinions

They're lightened, hard coated and precision cut. Available in 48P in 16T thru 28T, and 64P in 24T thru 38T. RRP 30XX (48P) and RRP 31XX (64P).

REAL PERFORMANCE PRODUCTS!

Traxxas Revo/2.5-Maxx Vented Flywheels

Aluminum vented flywheels move air over clutch bell, improving performance and cooling. Revo RRP 8052 and 2.5-Maxx RRP 8552 Vented Flywheels. Both Blue Only.

RC-10GT Hardened Steel Clutchbells

These Clutch Bells are CNC machined from solid steel then the teeth are machined on. This makes the part stronger with less gear "run out". Available in 14T thru 20T, 22T and 24T. RRP 22XX.

48P Hard Nickel Plated Steel Pinions

These precision cut gears have an extremely hard coating that makes them really last. Available in 12T thru 35T. RRP 1012 - RRP 1035.

ROBINSON RACING PRODUCTS
Voice 209.966.2465 · Fax 209.966.5937

BY KEVIN HETMANSKI PICS BY PETE HALL

One trick truggy

TRUGGIES—BUGGIES TURNED MONSTER TRUCKS— are taking over the RC truck racing world. Their low CG and tunable features make them naturals on the track. You can race a "monster truck," but it requires a lot of modifications and in the end, it still can't hang with a truggy on the track. To race a truggy, you once had to build your own using aftermarket parts and an 1/8-scale buggy. Now, manufacturers are jumping onto the truggy bandwagon with trucks that handle even better than buggy-based monster trucks do. One such company is Sportwerks, which debuted the well-received Mayhem 1/8 buggy and has now given it a monster makeover as the Mayhem ST. At first glance, it may look like a buggy with monster truck tires, but take a closer look: the wheelbase is longer, and new, longer suspension arms make it wider. It also has race features such as a computer radio, sealed gear diffs and a laydown steering servo. Let's drive.

Sportwerks MAYHEM

SPORTWERKS
Mayhem ST

KIT FEATURES

CHASSIS. The chassis is made of 3mm 6061 T6 aluminum plate with a hard-anodized finish. Front kick-up is stamped in, and the chassis' sides have been radiused to increase rigidity. The chassis braces are stamped pieces of hard-anodized aluminum plate, and they run between the gearboxes to the center of the chassis. Molded-plastic guards help to keep dirt out of the chassis, and large skidplates and bumpers protect the front and rear. The bumpers' endcaps have an attractive satin finish that's a nice change from chrome and black. The servos are mounted on an aluminum plate that's supported by a couple of plastic standoffs. The laydown steering servo can be mounted vertical if you prefer that configuration. Sportwerks includes a plastic mount that's attached to the servo plate, which will accept a personal transponder as well as a standard unit. A roomy, sealed radio box is home to the receiver and battery pack, and a silicone switch boot is installed.

DRIVETRAIN. The ST uses a racing-style 3-shoe clutch with a 13-tooth steel clutch bell to mesh with a 46T steel spur gear.. The center diff is a 6-gear sealed unit held by the split mounts usually seen only on pro buggies. Split mounts make it easy to get the center diff out for maintenance; just remove four screws. The front and rear vented disc brakes can be independently adjusted by twisting the knurled collars on the ends of the brake linkages. Dogbones connect the center diff to the front and rear diffs. Just like the center diff, the front and rear diffs are sealed, 6-gear units. The gearbox is split horizontally rather than vertically, and bulkheads support it on each side. Rebuildable universal-joint shafts drive 14mm hexes for aftermarket wheel compatibilty, and rubber-sealed ball bearings support the drivetrain's rotating parts.

ENGINE AND ACCESSORIES. The Sportwerks .26 engine features ABC construction, a 6-port sleeve, a throttle-return spring, a large cooling head and a 2-needle carb. There are three carb inserts with bores of different sizes: 6.5mm, 7.5mm and 9mm. The 6.5 smoothes acceleration and gives the engine the best fuel mileage; the 7.5 offers good mid-range power; and the 9 uses the most fuel but will allow the engine to breathe well and to produce maximum power. Instead of a pull-starter, the ST uses Sportwerks' Spin-start shaft system. The hand-held starter is powered by a 6-cell battery and uses an electric motor and gear drive to turn the crankshaft over. A clean-looking black tuned pipe and header take care of exhaust gases, and a prelubed dual-element air filter cleans the air that enters the carb.

INCLUDED ELECTRONICS & ACCESSORIES

JR RACING XR2I RADIO

This AM computer radio has many more features than typical RTR systems. It has 2-model memory, steering and throttle endpoints, an LCD display and digital trims. It's well balanced and has a good feel.

6-CELL RECEIVER PACK

The rechargeable pack saves money and delivers more punch than alkalines, and its 1100mAh capacity gives you maximum run time.

JR RACING Z590M STEERING SERVO

The "M" is for metal gears—always a good feature in a monster-truck steering servo. Claimed torque is 85 oz.-in., which could stand to be higher but is far superior to the 40 oz.-in. standard-type servos that some other trucks sneak by with.

JR RACING Z270 THROTTLE/BRAKE SERVO

This JR Z270 servo is a no-frills piece, but you don't need anything fancy to operate the throttle and brakes on this truck. It produces 49 oz.-in. of torque, and that's good enough for me.

SPORTWERKS WALL CHARGER

You can't use a rechargeable receiver pack if you don't have a charger. That's why Sportwerks includes a slow charger. Sorry kids; you'll have to let the battery charge overnight before you can use it.

SHAFT-STARTER AND TOOLS

Along with the Spin-Start shaft unit, the Mayhem ST includes a 5-way box wrench, hex wrenches and a small, open-ended wrench for basic maintenance tasks.

Left: exhaust exits through a tuned aluminum exhaust system. The mudguard has a molded-in stinger protector.

Right: the fuel tank has a built-in fuel filter and a large opening that's easy to pour fuel into. A molded trough directs spilt fuel away and down through the chassis.

SPECIFICATIONS

MANUFACTURER Sportwerks
MODEL Mayhem ST
DISTRIBUTED BY Horizon Hobby

SCALE 1/8
PRICE $500
Varies with dealer

DIMENSIONS
Wheelbase 13.5 in. (343mm)
Width 16.5in. (419mm)

WEIGHT
Total, as tested 152 oz. (4,309g)

CHASSIS
Type Stamped plate with front kick-up
Material 3mm 6061 aluminum

DRIVETRAIN
Type Shaft-driven 4WD
Primary 13T clutch bell/46T spur gear
Transmission ratio 3.31:1
Final drive ratio 11.7:1
Drive shafts (F/R) Rebuildable universals
Differentials Silicone-filled bevel gear
Bearing type Rubber-sealed ball bearing

SUSPENSION
Type (F/R) A-arm pivot ball/lower H-arm with adjustable upper link
Shocks Threaded-aluminum body with 3.5mm shafts and bladder seal

WHEELS
Type White dish with 14mm hex

TIRES
Type Split chevron

ENGINE & ACCESSORIES
Engine Sportwerks .26, slide carb, rear exhaust, external starter
Clutch 3-shoe
Manifold/pipe One-piece in-line exhaust
Fuel tank 125cc primerless

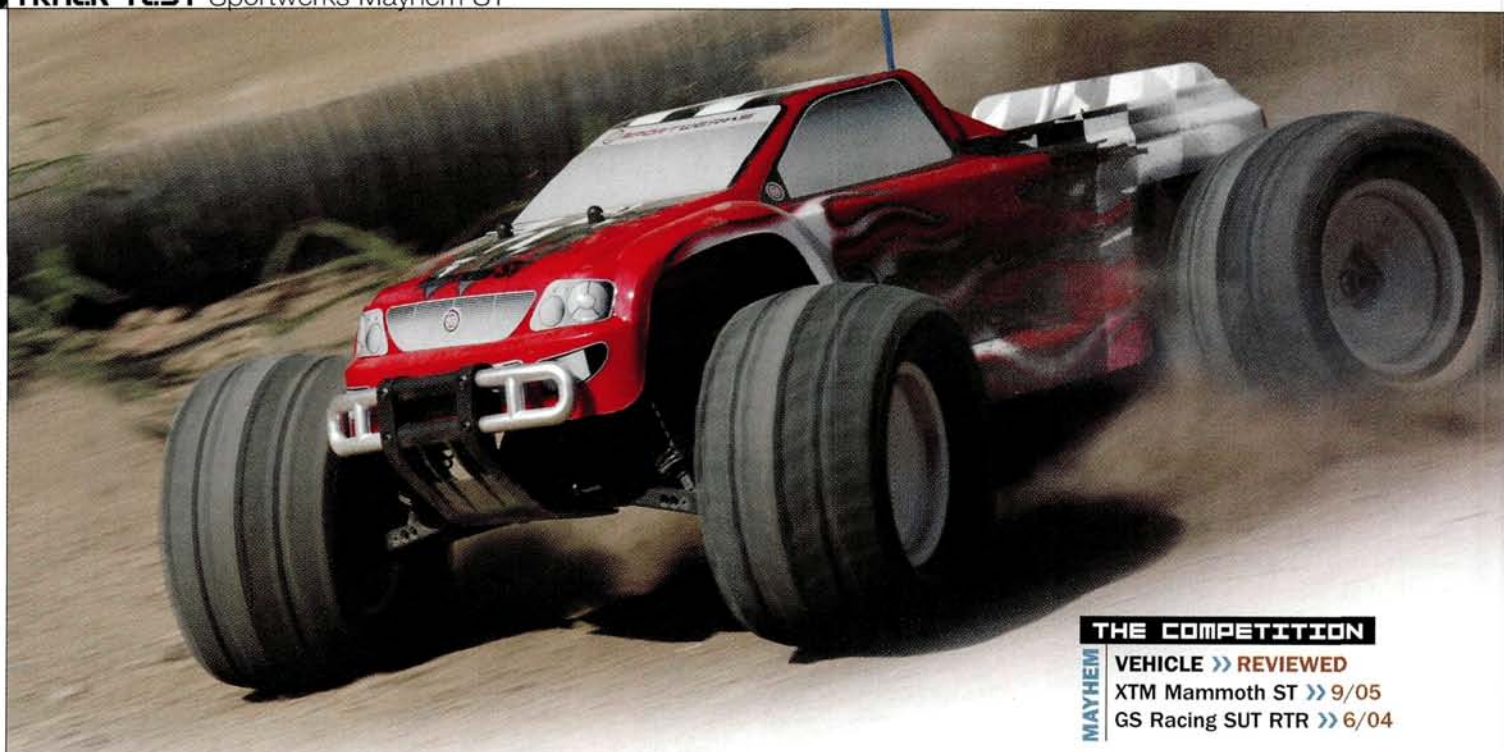
ELECTRONICS
Transmitter & receiver JR XR2i
Servos JR Z590M, JR Z270
Receiver pack Sportwerks 6-cell

The Mayhem ST's included tires are fine for backyard bashers, but racers may want tires with a little more grip.

FACTORY OPTIONS

- Shock adjustment collar—item no. SWK3012
- Pro steering drag link—SWK9108
- Blue, vented flywheel—SWK9190

Above: I love the look of this beefy bumper. Extra support on the top of it ensures that it will never bend in a crash. Left: you know Sportwerks means business when you see a laydown steering servo in the chassis; this lowers the truck's CG and enhances performance.



THE COMPETITION

MAYHEM

VEHICLE >> REVIEWED
XTM Mammoth ST >> 9/05
GS Racing SUT RTR >> 6/04

SUSPENSION AND STEERING. Independent suspension arms on all corners control the truck over bumps and keep it stable. The front has dual A-arms and the rear uses a lower H-arm with a turnbuckle upper link. The front arms have pivot balls at their ends to allow you to fine-tune front toe and width. Caster is adjusted by repositioning caster clips on the upper arms' hingepins, and wheelbase can be altered by changing the spacing of similar clips on the rear arm. You can also alter the upper link's position to adjust roll center. There are 3 holes in the shock tower and 2 holes in the rear hub to choose from. Four, top- filled aluminum shocks damp the ride, and dual O-ring seals keep the oil in and the dirt out. The pistons are held on the shaft with small locknuts that will withstand the hits to the piston when the truck's suspension tops out. The shock bodies are threaded, but clip-on spacers are used to adjust ride height instead of threaded collars. The stock shock fluid seems a bit light, but a little time in the dirt will determine whether that's true or not. With 6 holes in the shock tower and 3 in the suspension arms, there are plenty of shock-mounting positions. Front and rear swaybars keep the chassis flat in the turns.

A bushing-supported, dual-bellcrank steering system turns the truck in the right direction. The right side bellcrank has an adjustable, built-in servo-saver to protect the steering servo's gears. An aluminum drag link connects the two bellcranks and has 2 holes for the steering links. Use the adjustable turnbuckles to alter toe, and connect the bellcranks to the hubs.

The truck's aluminum shocks have threaded bodies, but strangely, they have molded spacers to adjust ride height.

BODY, WHEELS AND TIRES. The Sportwerks pickup truck body comes painted and trimmed; all you haved to do is apply the stickers. The body looks boxy to me, but it does do a good job of covering the chassis and reaches all the way down to the mudguards. The tires are glued to white, dish-type wheels, and their chevron-type tread will provide the truck with good backyard-bashing traction. But if you plan to race, tires with a track-ready tread should be your first upgrade.

FIND IT
>>> Go to page 219 for manufacturers' contact information

TUNING TIPS

MORE TRACTION
If racing is in your future, you may want to switch the tires before you do. The supplied tires are more suitable for backyard bashing. A tire such as Pro-Line's Bow Tie will get you hooked up in the dirt.

DISCONNECT THE SWAYBARS
The swaybars are there to help keep the chassis flat when turning on a track. When playing around the backyard, they can limit single-wheel travel over obstacles. It isn't hard to remove them: take out six screws, and you're on your way.

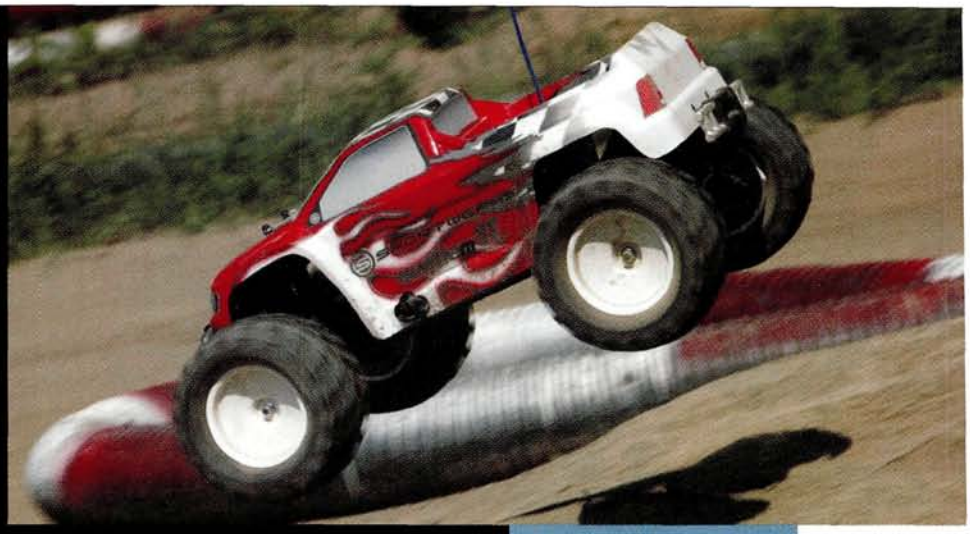
USE THE SMALL INSERT
If you are new to RC and this is your first truck, you may want to install the small carb restrictor (the medium one is installed at the factory). This will reduce engine power and is more likely to keep you out of trouble while you learn how to drive the truck.

LIKES
- Many tuning options.
- Reliable .26 powerplant.
- Rechargeable receiver pack.

DISLIKES
- Why no threaded collars for the shocks?
- Tires aren't as high-performance as the rest of the truck.

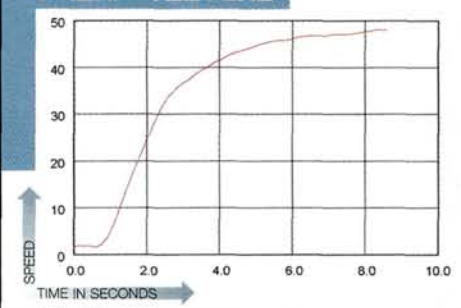
YOU'LL NEED	WE USED
Stick pack	Dynamite Dyna Fun 3000 6-cell
Charger	Dynamite Vision Peak
Ni-starter	Dynamite metered glow igniter
Fuel	Blue Thunder 20-percent nitro

PERFORMANCE



Xtreme RC in New Milford, CT, was our Mayhem ST's test track. Starting the engine couldn't be easier: put the starter shaft in the back of the engine, hook up the Ni-starter, and push the starter button. You can do all this without removing the body. The engine fired up after a couple of revolutions of the hand-held starter. The medium insert is installed in the carb, so I left it in there during my test runs. I'm impressed by the engine's power, and it's nice to know that I can get even more power by installing the larger insert. A truck is nothing if it can't put that power down, and this truck can definitely put the power down. Acceleration is pretty good but I would like it to be a little better out of the box. That's nothing a change in the gearing won't take care of. Once the engine gets on the pipe, the truck is gone, and it gets up to speed at a decent clip. When I hit the straight, I pegged the trigger and had to smile as the tires ballooned to about twice their size. That's cool to see, but it made the truck very unstable. You definitely have to make sure that the tuck is already pointing in the right direction before you get on it. When the tires grow like that, they act like gyros and make it very hard for the servo to maneuver. The lightly damped suspension felt good on the smoother sections of the track, but the jumps tripped the truck up quite a bit. The shocks soaked up the jumps a little too well, and that affected how the truck flew through the air. It was hard to get it over the doubles a few times because it didn't get enough air off the first jump. It bottomed out a few times because of the speed at which it hit the jumps, and that caused it to fly through the air with a nose-down attitude; I had to grab a handful of throttle to get it back up for the landing. All this can be solved by tweaking the suspension with thicker shock oil. The strong dual-disc brake system stops the truck easily. The stock setup had a little too much front brake, and that made it hard to enter the corners. It took me a few seconds to lift the side of the body and twist the brake collar on the front linkage to loosen that brake's grip. After that, I was able to enter the corners quickly by sliding the truck's rear with a quick stab of the brake. That slight brake adjustment helped the steering, but the tires still held the truck back. They slid way too much and caused the truck to push when running at any decent speed. Tires with a race-bred tread would help the truck out a lot here.

RADAR TESTING



Distance (in feet) traveled in:	0-132 ft. time	Speed at 132 ft.
1 SEC. 3.3	4.0 SEC.	47.7 MPH
2 SEC. 25.9		
3 SEC. 73.2	Time to top speed	Top speed
4 SEC. 130.8	8.3 SEC.	48.1 MPH
5 SEC. 194.3		

THE VERDICT

The Mayhem ST is packed with race-inspired features, it has a powerful engine, and it comes ready to go right out of the box. You can't beat that! The stock tires are the only disappointment. I can (and will) bolt on different tires and rims when I go to the track, and the selection is huge, since standard, 14mm hex wheels are a direct fit. If the ST was less of a performance-oriented truck, the tire issue would be a non-issue, but when it's already to "race," I just want it to go all the way! ■

RATINGS

Instructions	10	The instructions tell you everything you need to know, and they include full diagrams.
Included electronics	9	The standard computer radio, metal-gear servo and rechargeable receiver pack score big here.
Parts fit & finish	8	The parts finish is great, but there's a lot of play in the front upper arms.
Turn-in	8	Turn-in isn't bad considering the supplied treads.
Corner speed	7	You can't carry much corner speed without the truggy pushing. It's the tires.
On-power steering	7	There's a wicked push when on power. Race tires would be a big help.
Braking	10	Great brakes. No signs of brake fade during testing.
Bump handling	9	The suspension is very active and did a good job soaking up hits.
Jumping	8	Flies well, but the light damping reduces air time on takeoff and lets the chassis slap on touchdown.

Best buyer››› Everyone from noobs (since it's an RTR) to competition-minded truckers (since it's full of racing features).

1/10-SCALE 4WD RTR NITRO TOURING CAR

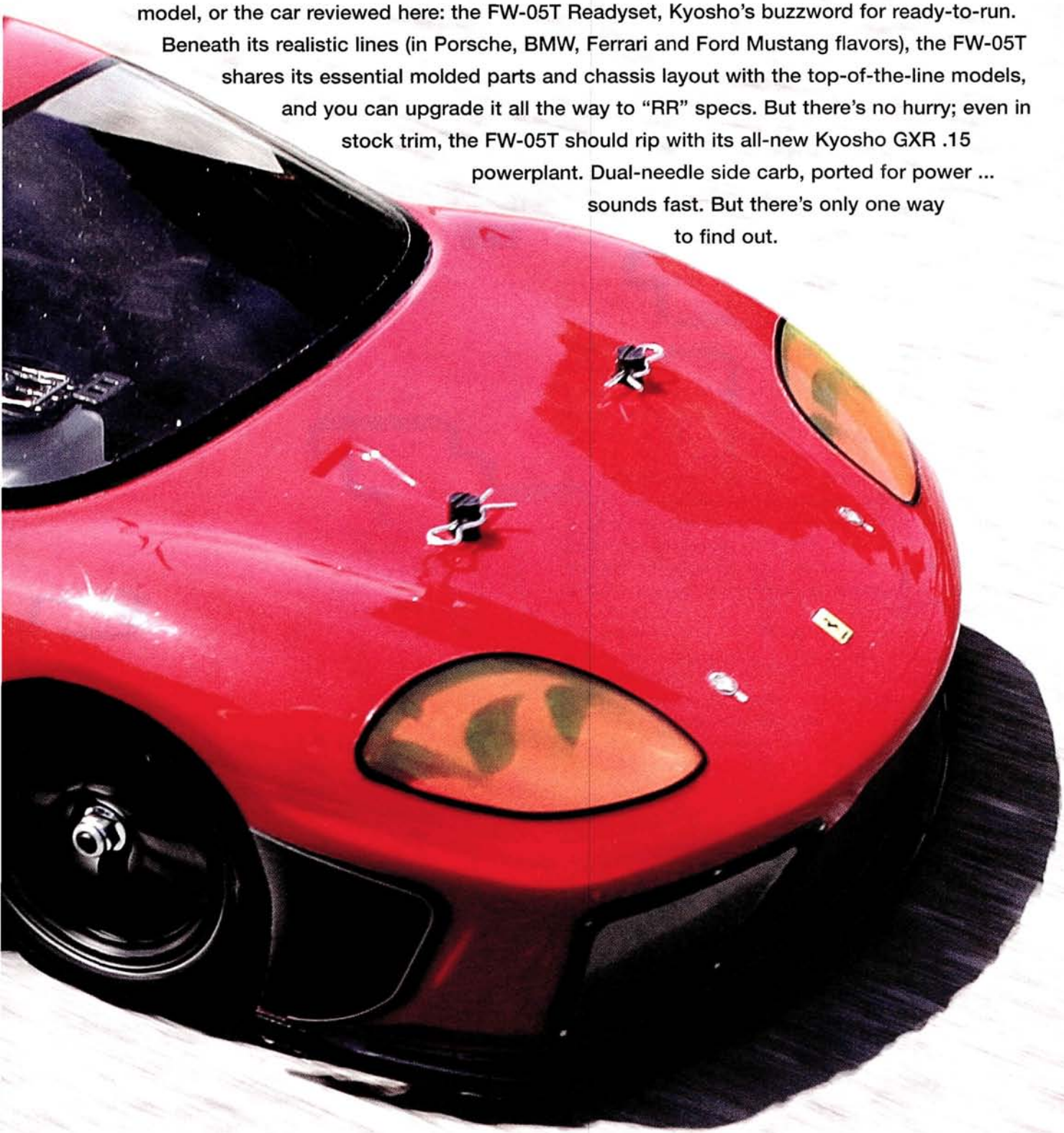
BY PETER VIEIRA | PICS BY DERON NEBLETT

Kyosho FW-05T

Kyosho's super shaft car goes "sport"

You can't say Kyosho doesn't give you choices. In addition to offering the fastest touring car at the IFMAR Nitro On-Road Worlds (that would be the V-One RRR), Kyosho also offers an equally track-ready shaft car, the FW-05. But shaft-or-belt aren't the only choices; you can get an FW-05 in competition-oriented "R" and "RR" models, the affordable "S" designation sport model, or the car reviewed here: the FW-05T Readyset, Kyosho's buzzword for ready-to-run.

Beneath its realistic lines (in Porsche, BMW, Ferrari and Ford Mustang flavors), the FW-05T shares its essential molded parts and chassis layout with the top-of-the-line models, and you can upgrade it all the way to "RR" specs. But there's no hurry; even in stock trim, the FW-05T should rip with its all-new Kyosho GXR .15 powerplant. Dual-needle side carb, ported for power ... sounds fast. But there's only one way to find out.



KIT FEATURES

CHASSIS. At 3mm thick, the FW-05T's aluminum chassis is thicker than most other RTR tourers', and its deep cobalt anodized finish is a big style step up from silver and played-out purple. Naturally, it's fully countersunk, but the bottom of the chassis is not entirely smooth; "blisters" are stamped into the chassis under the differentials, so the diffs can sit as low as possible for a lower center of gravity (CG). Kyosho pioneered this technique with the Inferno 7.5, and it makes even more sense for a nitro tourer.

Topside, the FW-05T uses a plastic upper deck/radio box combo to hold the servos and stow the radio gear. The radio box swings open from the side to hold the gear without stacking it—again, to keep the CG as low as possible. A molded-in switch housing and a transponder mount with standard and "personal" AMB drilling are nice touches, and a small finger hoop lets you easily hold the car for throttle-blipping (but isn't tall enough to protect the engine's heat-sink head when running sans body).

DRIVETRAIN. Shaft-drive is the FW-05 series' claim to fame, and the new "T" version brings an interesting new twist. The center driveshafts are plastic, but before you wince, let me assure you that they are very thick and slot deeply into their drive cups. It should also be noted that there is no deflection in the shafts, so there's no slippage between the shafts and the cups. Plastic axles have been used successfully in high-load applications by other brands, so I expect the FW-05T's parts to hold up just fine, but we'll have a look after testing to be sure.

Another interesting item is the front diff: there isn't one! A solid spool spins the front wheels and was spec'd in the interest of easy driveability (we'll see). In the rear, a sealed, 4-gear bevel diff is put to work. It's grease-filled from the factory (of course), but it can hold silicone fluid. Steel dogbones make the final connection to the wheels, and metal-shielded ball bearings keep all the parts spinning happily.

I saved the best for last. The heart of the drivetrain is a 2-speed transmission, but it isn't a hard-shifting, pawl-type cheapie; it's a genuine 2-shoe, clutch-type unit for smoother shifts and positive engagement. The shift point is adjustable, naturally, but access to the adjustment screws is tight. The 2-speed's layshaft is also home to the disc brake, which uses a padded caliper to squeeze a drilled aluminum rotor. It beats the plastic-rotor/plain-steel-caliper setup used by most other RTRs.

INCLUDED ELECTRONICS & ACCESSORIES

KYOSHO PERFEX KT-3 TRANSMITTER
Don't let the looks fool you: the KT-3 is a full-size pistol. It just looks small because of its compact "head." Strictly basic AM stuff, but it is reliable and its 3-LED battery meter and dual-rate steering are bonuses.

TOOLS AND SPARES
Kyosho supplies a man-size box wrench to handle glow-plug changes and wheel removal (plus other nuts, if there were any other nuts on the car) and hex L-wrenches for the linkage setscrews, the droop screws and the pivot balls and their retainers. There's also a tiny spare parts bag with two extra body clips, setscrews and a couple of E-clips.

KYOSHO KS-3 SERVOS
The KS-3 is Kyosho's take on a plastic-gear, "standard type" 40 oz.-in. servo. They work well in the car's intended play mode and help to keep costs down, but they're kinda noisy. That doesn't hamper the car's fun factor, but when you operate them on the bench, the servos' ratchety sound stands out.

SUSPENSION AND STEERING. Here, you'll find pivot balls all around with one-piece plastic steering links and rear camber links. Sure, they aren't adjustable, but at least they snap over ball studs instead of low-rent pivot screws. That means it's easy

Left: the GXR .15 gives the FW-05T a 44mph punch, but it's totally mild-mannered when it comes to starting and tuning.

Right: the padded caliper and steel rotor are a powerful combo. Note the convenient dial-type adjustment on the brake linkage.

SPECIFICATIONS

MANUFACTURER Kyosho
MODEL FW-05T Readyset
SCALE 1/10
PRICE $270
Varies with dealer

DIMENSIONS
Wheelbase 10.1 in. (258mm)
Width 7.8 in. (200mm)

WEIGHT
Total, as tested 62.4 oz. (1,769g)

CHASSIS
Type 3mm aluminum lower plate with plastic upper deck/radio box

DRIVETRAIN
Type 2-speed, Shaft-driven 4WD
Primary ratio 2.43:1 (1st), 1.77:1 (2nd)
Transmission ratio 2.86:1
Final drive ratio 6.95:1 (1st), 5.06:1 (2nd)
Drive shafts Dogbones
Differentials Bevel gear
Bearing type Metal-shielded ball bearings

SUSPENSION (F/R)
Type Pivot ball
Shocks Plastic-body, oil-filled

WHEELS
Type One-piece plastic, split-spoke design, 12mm hex

TIRES
Type Firm rubber slicks with foam inserts

ENGINE & ACCESSORIES
Engine Kyosho GXR .15
Clutch 2-shoe centrifugal
Manifold Cast alloy
Pipe Cast alloy, dual chamber
Fuel tank 75cc, pump primer

ELECTRONICS
Transmitter/receiver Kyosho Perfex KT-3
Steering & throttle servos Kyosho Perfex KS-3
Receiver pack 4-cell AA holder, cells not included

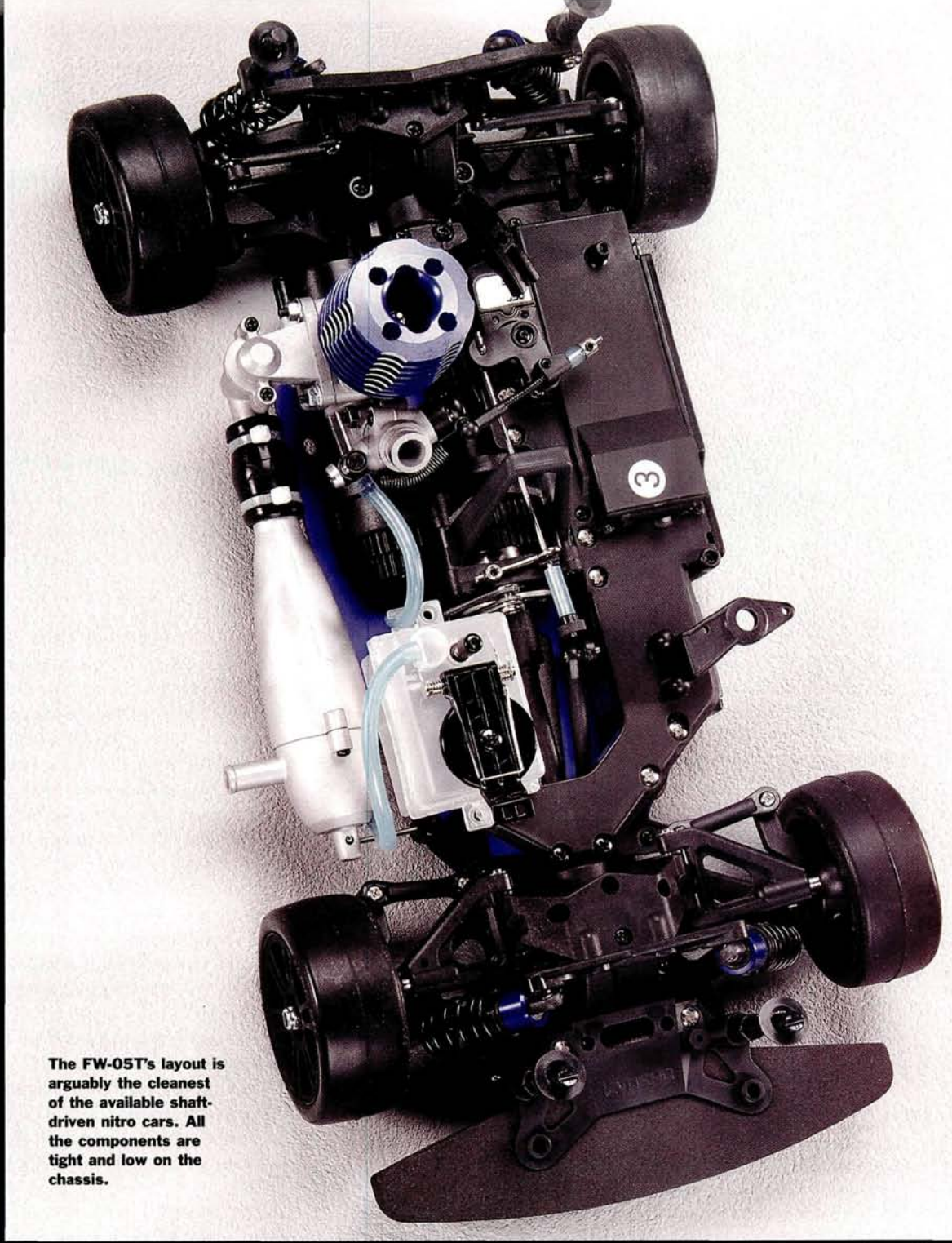
FACTORY OPTIONS

This has the potential to be a really long list, since the FW-05T can be upgraded all the way to top-of-the-line "RR" status. Here are a few key components:

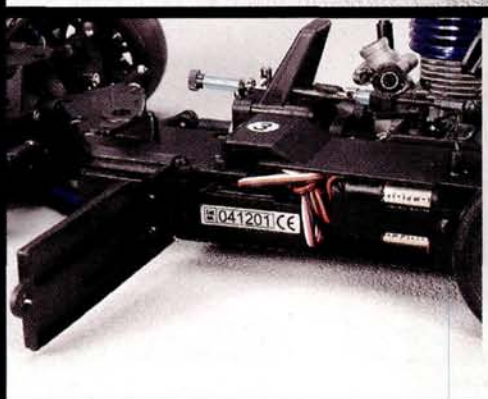
- **Aluminum V-One shocks (pair)—VZ075**
- **Swaybar sets—VZ084S (front), VZ085 (rear)**
- **Super tuned pipe and manifold—39011**
- **Universal swingshafts (pair)—VSW006**

Carbon:

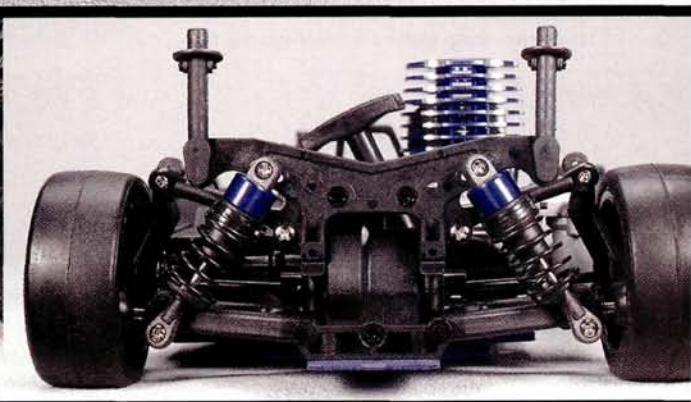
- **Upper deck—item no. VSW022**
- **Shock towers)—VSW004B (front)/VSW005B (rear)**
- **Steering plate—VSW014**



The FW-05T's layout is arguably the cleanest of the available shaft-driven nitro cars. All the components are tight and low on the chassis.

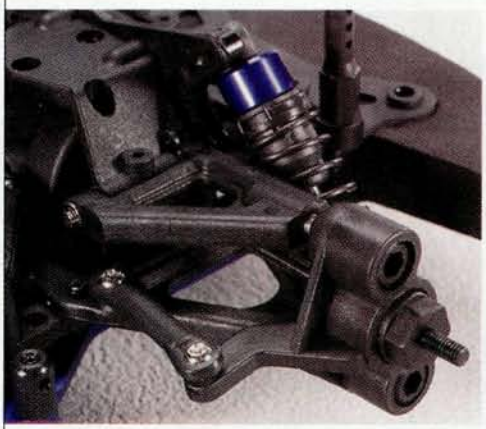


The swing-out radio-box door reveals the receiver and its battery holder. There's little space to spare, but everything fits neatly.



Plastic-body shocks handle the damping, and the suspension geometry is nitro-specific; the high-rise hub carriers attest to that.

to upgrade to turnbuckle linkages later. The front upper arms slide on their hingepins for caster adjustments, and the rear uprights have high-rise camber-link mounting positions for a nitro-friendly roll center. There are provisions for swaybars, although none are included. Plastic-body shocks with aluminum cap-sleeves do the damping, and the factory fill job is well done.



Fixed steering links mean toe-in is non-adjustable, but you can mess with caster and camber. Droop screws set the ride height.

LIKES

- **It really is ready to run. Fill it up and go.**
- **Appropriately fast; 45mph is plenty and much more manageable than a 60mph car that quickly goes farther than the radio can transmit.**
- **Ultra-reliable engine with legs. It starts easily, it tunes easily and it rips.**

DISLIKES

- **C'mon, throw some preload spacers into the box!**

TUNING TIPS

LUBE THE AIR FILTER ...

... if it needs it, that is. My car came with a dry filter, but all FW-05Ts should have pre-lubed filters by the time you read this.

PICK-UP PRELOAD SPACERS

The FW-05T uses droop screws to set ride height, but "tall" settings may require additional preload spacers that aren't included with the kit. RPM offers a nice set—in colors, no less.

SETTING RIDE HEIGHT

It's easy to find the droop screws in the rear arms and to dial them in a few turns to raise the rear ride height, but the front droop screws are tougher to spot. They're actually accessed through the holes in the upper bumper mount. I raised the ride height a couple of millimeters after I noticed that the diff blisters were taking a beating when the car crossed cracks in the pavement.

ENGINE AND ACCESSORIES. A Kyosho GXR .15 engine gets the FW-05T rolling, and it's a good-looking little mill with its blue-anodized beehive head. The carburetor is its most obvious new feature. Instead of the old single-needle rotary jobs from Kyosho's previous RTRs, the FW-05T gets a free-breathing, fully adjustable, 2-needle slide-valve unit. Better tunability and fuel/air flow means more horsepower; we always like that. But there's more power-increasing stuff going on here; according to Kyosho, the GXR has new port-timing specs for a bigger punch when you pull the trigger.

Even the pull-starter is trick (you don't hear those words together too often). There's no one-way bearing; instead, a cam mechanism engages the crankshaft when the starter is tugged and disengages when the engine starts. Once the engine is running, there's no drag on the system; it's as efficient as a bump-start unit.

Fuel delivery is provided by a pump-primed 75cc tank conveniently under the pre-trimmed windshield for easy access. After the fuel goes bang in the combustion chamber, it's hustled out through a two-piece cast manifold and a three-piece cast pipe—functional, but I'd like to see Kyosho step up with a less restrictive tubular manifold and a lighter thin-wall pipe.

BODY, WHEELS AND TIRES. All FW-05Ts include firm rubber slicks glued to split-spoke wheels with foam inserts. Although they don't photograph well, I'm a big fan of the black-on-black look. There are four body options: Porsche 911 GT3; BMW M5 GTR; Ferrari 360 GTC (my choice); and a Mustang GTR (that one is coming soon).

FIND IT

>>> Go to page 219 for manufacturers' contact information

YOU'LL NEED	WE USED
Fuel	Byron Race 20% nitro
AA batteries (12)	Sanyo 2500mAh NiMH
Glow starter	Dubro EZ

PERFORMANCE

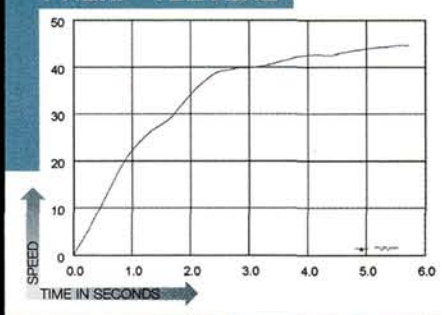
"Watch this," I bragged, "I'm gonna start it with one pull." That was me getting ready to show off to fellow editor Matt Higgins, and I was right. Since I had taken the time to make sure my glow starter was charged and the engine was primed, the FW-05T crackled to life with the first tug of the pull-starter. As expected, the mixture was very rich, so I leaned it out enough to get good clutch hookup and then proceeded with break-in. I've always had great experience with Kyosho engines, and the GXR .15 is yet another dead reliable powerplant. I appreciated the dual-needle carb as I continued the break-in and zeroed in on the best performance settings, and the FW-05T was ready for the radar after four tankfuls of Byron fuel.

The FW-05T was a little squirrely during my first practice runs with full steering, so I rolled back the dual rate on the transmitter. The car also shifted later than I'd have liked, but as the drivetrain broke in, it began to shift earlier. I suspect that the 2-speed's springs were taking a "set," since the shift point didn't drift any farther after a handful of full-throttle runs through second gear. When it was time to switch on the radar and make it count, I ripped off a first pass of 43mph, and with a few more carb tweaks, I squeaked out a best run of 44.6mph. As the radar runs piled up on the laptop screen, the GXR's consistent power delivery was revealed as virtually identical curves.

After wrapping radar testing, it was time to play. The solid-spool front end makes it very hard to get into trouble with oversteer. You can mash the throttle and crank the wheels, and the FW-05T will still hook up and move out. It will swing the rear end, but it won't do an instant spinout. Combined with the willing engine and firm, slick tires, the diff-less setup makes it easy to drift the car around curves and generally let it all hang out. The downside to the setup is greater understeer when you try to drive the car quickly in a racetrack setting, but for roosting a parking lot, it's a non-issue.

It's easy to forget about braking when running in the great wide open of a parking lot, but the FW-05T does have a strong set of binders, just in case. Locking power is on tap; just be prepared to lose steering, since the front tires aren't linked to a diff, and both will lock up simultaneously. If you can stay on the edge of lockup, the FW-05T will stay in complete control until it comes to a stop. Modulation could be better, but it's really a servo thing; like other "standard" servos, the Kyosho linkage movers aren't high-precision units. The important thing is that the FW-05T stops when you need it to.

RADAR TESTING



Distance (in feet) traveled in:	0-132 ft. time	Speed at 132 ft.
1 SEC. 17.3	3.3 SEC.	40.4 MPH
2 SEC. 58.7		
3 SEC. 115	Time to top speed	Top speed
4 SEC. 175.4	5.73 SEC.	44.6 MPH
5 SEC. 238.5		

THE VERDICT

The FW-05T is exactly what a good nitro RTR should be: easy to start and tune, adjustable, reliable, fast, and fun to drive. Some of the other guys in the office wished for electric starting, but I prefer the simplicity of a pull-starter (as long as it's a sturdy one like the FW's) to the higher weight and complexity of an electric starter (not to mention the added cost of a battery and charger to power it). Heck, the engine started with three pulls or less every time–how lazy are you guys? Choose the body style you like, grab up a jug of fuel and proceed directly to the parking lot. ■

RATINGS

Instructions	7	Just the basics for battery installation and carb setup, plus getting started info and exploded views.
Included electronics	7	Up: reliable transmitter with dual rate. Down: funky styling, noisy servos.
Parts fit & finish	9	Everything looks good; cobalt blue anodizing is a standout.
Turn-in	8	Nice response; could be more aggressive, but ideal as-is for the intended buyers.
Corner speed	9	The solid front end really pulls the car around. Go fast!
On-power steering	8	Responsive; understeers when pushed hard.
Braking	8	A "10" for power but lacks fine control

Best buyer››› High-speed street drivers with at least a little RC experience.

BY PETER VIEIRA PICS BY PETE HALL

Tamiya Subaru Impreza WRC

2004 TL-01RA LIMITED EDITION

OK, RALLY FANS—HERE IT IS: a scale(ish) rally car that can truly go off-road with no belts to foul, no heat-holding chassis covers and no conversion kit required. And it's tough, too! Tamiya's latest rally machine is built on the classic TL-01 platform with 2002's "LA" (long arm) specs, which improve handling and adjustability. The body is completely painted and decaled for you with all the detail bits attached—you don't even have to put the mirrors on. "Oh, so it's an RTR," you ask? Nope, Tamiya leaves all the building to you, which is great news for me; as far as I'm concerned, there's no better build than a couple of hours with a Tamiya car and a good movie. I'm going to fire up "Anchorman" and get started. Time to musk-up!

Testing Tamiya's dual-purpose rally ride

KIT FEATURES

CHASSIS. The basic TL-01 platform is now eight years old, but there's still nothing else like it in RC. Instead of a tub or a plate chassis, the TL-01 design is a monocoque-like, molded-plastic "backbone" that incorporates the front and rear gearboxes, battery tray, arm mounts and shock towers in a single form. The chassis splits down its center, clamshell-style, so the transmission gears can be installed, while the driveshaft runs along the left side of the chassis in a protective channel. A motor mount is also integrated into the chassis with three fixed positions for three pinion choices and goof-proof gear mesh. Although originally designed as a road chassis, the TL-01's enclosed design makes it highly dirt-worthy; in fact, Tamiya has built three previous off-roaders around the platform: the Baja King, Baja Champ and Stadium Raider. As part of the TL-01RA remix, the underside of the chassis now has a servo-saver access hole under the steering servo and a dirt escape hole just ahead of the rear gearbox.

DRIVETRAIN. The Sube's drivetrain is all about reliability in the form of extra-wide gears and Tamiya's time-tested, bevel-gear differentials. The same 5-gear diff design has served nearly all of Tamiya's 1/10 electric kits. You'll wear everything else out before these differentials bite the dust! The diffs use splined metal outdrives and plated-steel dogbones to reach the wheels, and a single steel driveshaft connects the front and rear gearboxes. Plastic bushings support all the rotating parts, with the exception of the hard-working spur gear/countergear in the rear gearbox, which gets a set of Oilite bushings.

SUSPENSION AND STEERING. The original TL-01 has super-short, two-piece suspension arms and extended hubs, but the TL-01LA (on which the Subaru's RA suspension is based) updated the design with longer one-piece arms, less-offset C-hubs and rear uprights and adjustable camber links instead of one-piecers. You'll also find plated-steel hingepins with E-clips instead of less strong (but more convenient) screw pins. What you won't find is oil-filled shocks, just a set of rubber-sleeved friction shocks. C'mon, Tamiya, at least throw in your plastic-body oil shocks. Feel free to add a few bucks to the kit price; we'll gladly pay to forego the pogo sticks.

BUILDING AND SETUP TIPS

I've yet to come across a Tamiya kit that was hard to build, and the TL-01-series cars are particularly easy. I have a few tips to add, but all you really need to do is follow the instructions.

STEP 1. Note the diagram at the bottom of the page. It explains how to measure your servo so you can install its mounts for proper linkage clearance.

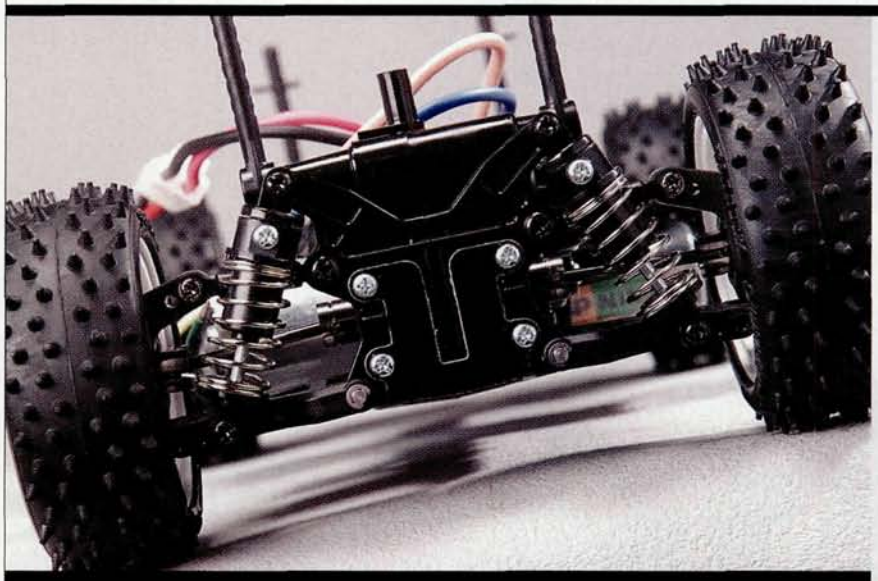
STEP 2. Don't forget to install the B3 spacer under the servo-saver screw. If you don't install it, the servo-saver will pop apart while you drive.

STEPS 7 TO 9. Don't overload the gears with grease. A few dabs on each gear is enough; as the gears turn, the grease will be evenly distributed.

STEP 23. The kit includes two "C" parts trees, which gives you a spare front bumper. Instead of installing the MB22 cap plate, install the spare bumper on the rear of the car for extra crash protection.

BETTER ARM PROTECTION. The included front bumper isn't designed for off-road use, and it leaves the suspension arms exposed to damage. The bumper from the Baja King/Champ has a built-in skidplate and offers much better protection. You'll need the "C" parts tree (item no. 0005688).

INCLUDED ELECTRONICS. Most kits skip electronics altogether or give you a motor, at best. The Sube includes a motor (the usual silver-can Johnson 540 stocker) and also delivers a high-quality electronic speed control. It's the TEU-B01K (great name) you'll find in many of Tamiya's other new electric kits. The speedo looks nondescript with its black-on-black styling, but it's full of features. It has pushbutton setup, gear-saving double-pump reverse operation and a "power on" alarm that alerts you if you turn off the transmitter but forget to turn off the car. It can handle motors down to 20 turns, so there's room to upgrade to a slightly hotter motor down the line.



Above: friction shocks boing the Subaru over bumps, and buggy tires give decent ground clearance for off-roading. Right: capped one-piece suspension arms and adjustable camber links are upgrades that debuted with the TL-01LA back in 2002.

SPECIFICATIONS

MANUFACTURER Tamiya
MODEL Subaru Impreza TL-01RA
SCALE 1/10
PRICE $130
Varies with dealer

DIMENSIONS
Wheelbase 10.08 in. (256mm)
Width 7.5 in. (190.5mm)

WEIGHT
Total, as tested 56 oz. (1,588g)

CHASSIS
Type 3-piece monocoque style
Material Plastic

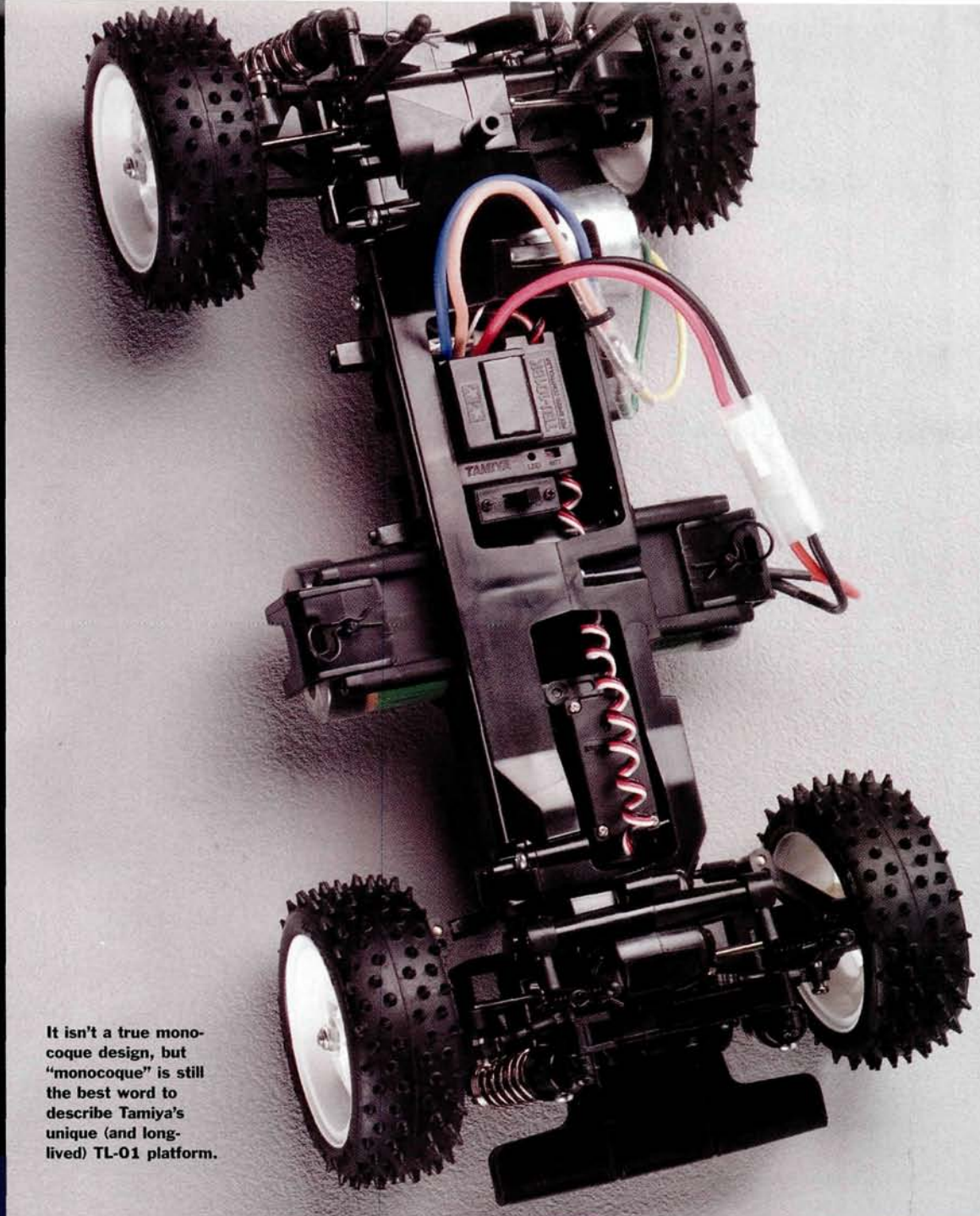
DRIVETRAIN
Type Shaft-driven 4WD, enclosed gearboxes
Primary 19-tooth pinion, 32-tooth spur gear
Transmission ratio 4.73:1
Final drive ratio 7.96:1
Driveshafts Steel dogbones
Differentials Bevel-gear
Bearing type Plastic bushings, Oilite countergear bushings

SUSPENSION
Type Lower H-arm with threaded camber links
Shocks Plastic-body with rubber friction sleeve

WHEELS
Type One-piece "dish star" pattern, 2.2 in.

TIRES
Type Tamiya Super Gripper, spiked tread, hard rubber

ELECTRONICS
Transmitter/receiver Not included
Servo(s) Not included
Speed control Tamiya TEU-B01K reversing
Motor Johnson 540
Battery Not included

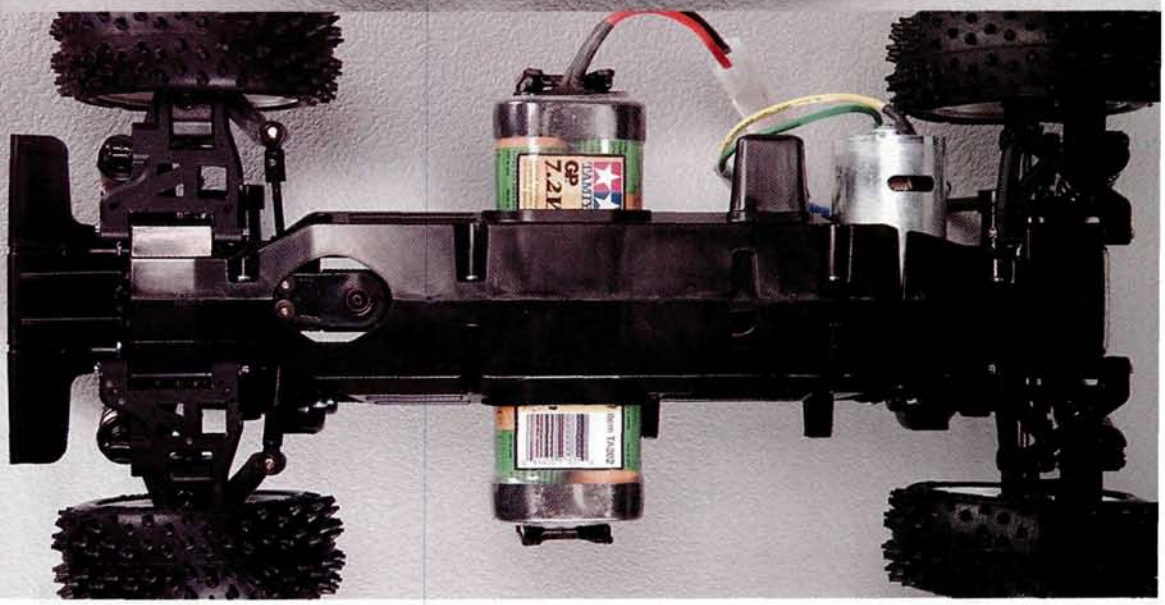


It isn't a true monocoque design, but "monocoque" is still the best word to describe Tamiya's unique (and long-lived) TL-01 platform.

FACTORY OPTIONS

- Ball bearing set—item no. 53292
- Graphite driveshaft—53323
- Quick-release battery holder—53346
- Fluorine-coated aluminum shock set—53571
- Universal driveshafts—53615

**Partial list, more options available*



This underside view shows off the servo-saver access hole and the opening under the radio compartment, which prevents dirt from piling up in the chassis.

BODY, WHEELS AND TIRES. A typical Tamiya racing body takes about 10 minutes to paint one color, followed by four hours of tedious decal trimming and application. Not so with this Subaru; it's fully painted, perfectly decaled and highly detailed. The rearview mirrors and rear wing are injection-molded and installed, and all the mounting holes are in place. The windows are the only bummer; they're decals instead of clear plastic. I don't care, I'm just glad I didn't have to decal it.

The wheels and tires are about as far from scale as you can get, but they make the Subaru off-road ready. The rims are Tamiya's dish-star design last seen on the Gravel Hound and Rising Storm DF-02 buggies. The buggies' narrower front rims are used on all four corners of the Sube along with their super-hard "Super Gripper" spiked tires. You won't need glue or inserts for these tires; they're just that hard. Tamiya even mounts them for you.

LIKES

- Factory-finished body.
- Includes a terrific speed control.
- It's a kit, so no one stole my building fun!

DISLIKES

- Bouncy friction shocks.
- Slow with stock motor (OK for beginners, though).
- Needs a better front bumper for off-road action.

FIND IT

››› Go to page 219 for manufacturers' contact information.

YOU'LL NEED	WE USED
Radio system	Futaba 2PL
Steering servo	Futaba S3003
Battery	Tamiya 3300mAh
Charger	Novak Ionic

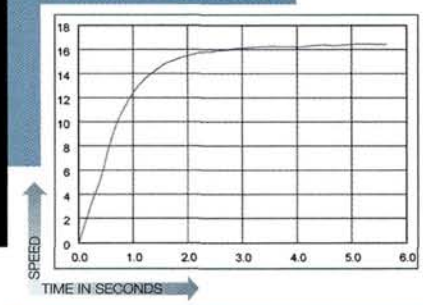
PERFORMANCE

Like just about every 540-powered Tamiya car, the Subaru tops out at around 17mph. That's OK-for-beginners speed, but you'll soon want more velocity if your driving is done in wide-open spaces like a parking lot or a large driveway. I had a lot more fun after I set up a tight course to thread the car through, which took the emphasis off sheer speed. On pavement, the spiky tires let the rear end drift out while cornering, and there was a lot of body roll, but it made the Subaru look like it was really hustling. It's basically impossible to get into trouble with the stock motor, which lets beginners concentrate on turning left and right instead of avoiding spinouts.

In the dirt, the Subaru really came alive. Turn-in is quick, and the car drifts through turns realistically with clouds of dust in its wake—like a scene straight from the World Rally Championship. The suspension showed its shortcoming as the chassis bobbed over bumps and bottomed out frequently, but it was surprisingly sure-footed despite its narrow track (then again, the tame kit motor hardly challenges the car, but I still give it points). Jumping is sketchy, because the car's narrow track doesn't forgive off-center takeoffs, and its nearly undamped shocks bottom out easily. But smooth rollers aren't a problem, and the Subaru looks incredibly "real" as the chassis unweights and the wheels droop out from under the fender wells.

My test session ended with a mud-run at Xtreme RC Raceway in New Milford CT. The regular race was a rain-out, but that didn't stop me from getting the Subaru dirty. Roosting around in the wet was a blast, but it sure made a mess of the car. When I took it off the track, it seemed to have doubled its weight in mud! But with the exception of a water-induced radio glitch, it never stopped chugging. Classic RC fun.

RADAR TESTING



Distance (in feet) traveled in:	0-132 ft. time	Speed at 132 ft.
1 SEC. 10.4	5.9 SEC.	16.7 MPH
2 SEC. 32.0		
3 SEC. 55.1	Time to top speed	Top speed
4 SEC. 79.1	4.6 SEC.	16.7 MPH
5 SEC. 103.3		

THE VERDICT

Scale purists will scoff at the goofy buggy wheels and tires, but if you're all about driving and having fun (and you're into rally cars), you'll like the newest Tamiya take on a Subaru rally racer. I'm still holding out for oil shocks, but they're easy to add later. Ball bearings would be nice, too, especially since adding them later requires an entire teardown of the car. But, hey—you built it once; you can build it again. Look elsewhere for a race car or a serious off-road ride, but for rally-style fun running, you could do a lot worse than Tamiya's Subaru Impreza TL-01RA. ■

RATINGS

Instructions	9	Excellent, as always. Add color, and it's a 10.
Parts fit & finish	9	Everything just falls into place.
Turn-in	8	Nice bite when initiating a turn, but the soft shocks don't make the most of the grab.
Corner speed	8	The spiked tires slip and slow the car when cornering hard.
On-power steering	7	Pushy, but who cares? Just have fun.
Braking	9	Excellent control and powerful, too.
Bump handling	5	Lightly damped shocks ride like pogo sticks.
Jumping	5	You won't break it, but narrow cars with short-travel suspensions just aren't made for jumping.

Best buyer››› All rally fans, first-time builders, anyone who likes a good build (but doesn't like painting).

1/18-SCALE ELECTRIC 4WD MONSTER TRUCK

BY KEVIN HETMANSKI PICS BY PETE HALL

MONSTER TRUCKS AND MINI-TRUCKS ARE HOT CATEGORIES on their own, so it's no surprise that mini-monster trucks are a fast-growing RC scene. PTI, best known for Lexan bodies, has made a huge leap into the mini-monster business with the all-new Goliath, a "true monster" design that wraps up 4WD, ball differentials and 4-link suspension in an 1/18-scale package that accepts "full-size" electronic gear. PTI sells the Goliath as a kit complete with clear body, RPM wheels and IMEX tires, so you can style it out with the electronics you like. But you won't have to pony up for a motor; PTI puts a 550 right in the box. No 380 here—this mini has "big motor" power!

A true mini monster

PTI GOLIATH

8TH

KIT FEATURES

CHASSIS. I don't think a monster truck chassis can get any simpler than this one. Four pieces of ¼-inch-thick aluminum square stock make up the top rails, and a pair of stamped-aluminum side plates support the suspension links and shock mounts. A pair of molded plastic plates hold the speed control, receiver and battery. The speed control and receiver are mounted in the front of the chassis while the battery sits in the back, held tightly by a slip-on battery strap that is released by a body clip. Space is available on the top of the battery mounting strap for any electronics that don't fit on the front plate. I had no trouble fitting a largish LRP A.I. speed control.

DRIVETRAIN. The Goliath's center "transmission" is really just a holder for the spur gear, which is driven directly by the motor's pinion. The aluminum motor-mounting plate is slotted to allow you to adjust gear mesh and change the pinion gear. The spur gear is fixed to a solid spool (no center diff), and rebuildable CV driveshafts transfer power to the front and rear ball differentials. They're Associated TC3 units, so lightweight plastic outdrives are standard. Within the axle tubes, steel dogbones join the diffs to the stub axles. The entire drivetrain is supported by ball bearings.

SUSPENSION AND STEERING. The solid-axle setup uses tried-and-true 4-link suspension to help the truck climb over all kinds of terrain. The links are adjustable turnbuckles, so you can easily tweak the length of the wheelbase and alter the axle's caster and anti-squat angles. Adjustable links connect the axles to the bushing-supported cantilevers. The cants squeeze top-mounted, plastic-body, oil-filled shocks.

The Goliath's steering system is simple but effective. The servo is mounted upside-down on a molded-plastic plate, and turnbuckle linkages attach it to the steering hubs directly. Two servo-mounting plates are included in the kit; one for a standard-size servo and the other for a microservo. Turnbuckles also keep the rear hubs in place and let you set toe-in precisely. The rear axle is also designed to accept a servo mount, so you can easily set up the truck with 4-wheel steering.

BUILDING & SETUP TIPS

I gotta give the folks at PTI props for pulling off a first-class manual even though the Goliath is their first stab at a kit. The text is clear and complete, and each step is supported with a photo (and it's a good photo). First-time builders may find the build a bit tricky (but not hard), while experienced wrench-turners should have no trouble.

BIND BUSTER

The steering links didn't operate freely on my kit. If yours bind, try polishing the ball studs and putting a drop of oil in each cup.

TEST THE DIFFS

Before you put the diffs in the axles, make sure that they are set properly by holding the outdrives as you try to turn the diff gear—it shouldn't slip. If you discover they are too loose after you've assembled the truck, you will have to tear down the truck to access the diff adjustment nut. The axle design doesn't allow you to remove the dogbone to access the diff.

BAG C, STEP 2

When gluing the 3mm nuts into the axles, make sure that the nut is perfectly straight. If it isn't, the screw won't go into the piece properly. The manual shows glue being applied to the axle before the screw and nut are installed. I prefer to install the screw and nut before I apply glue. Make sure that you apply glue only to the outside of the nut, not the threads.

CHASSIS ASSEMBLY

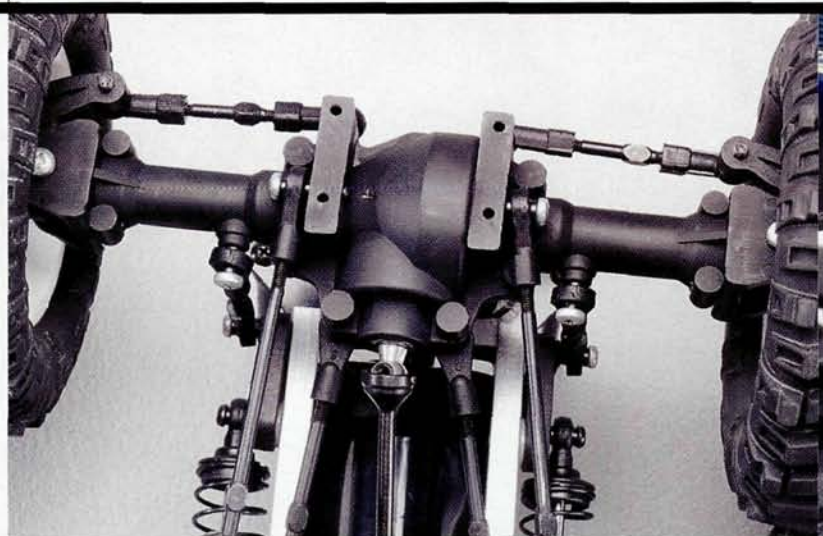
When you install the machine screws into the chassis, use a little thread-lock on them to ensure that they stay tight.

TIRE TIP

The IMEX tires have a directional tread pattern, so be careful they are oriented properly. Trust me; you don't want to mount them more than once. The rim diameter is much larger than the tire's inside diameter, and it requires a lot of stretching to get the tire on.

MOTOR INSTALLATION

Make sure that you solder the motor wires to the motor before you install it in the truck. Once the motor is in, you don't have very good access to the solder tabs. Installing a connector between the motor and speed control will make your life much easier.



With the aluminum skidplate removed, we can get a closer look at the axle. Each is molded in two pieces and encloses a ball differential. The center shafts are rebuildable CV units.

Oil shocks are squeezed by cantilevers to smooth the truck's ride. The shocks are top-filled and use a screw-on bottom cap for easy seal access.

SPECIFICATIONS

MANUFACTURER PTI
MODEL Goliath
SCALE 1/18
PRICE $200
Varies with dealer

DIMENSIONS
Wheelbase 8 in. (217mm)
Width 10 in. (254mm)

WEIGHT
Total, as tested 56 oz. (1,588g)

CHASSIS
Type Stamped-plate with upper rail
Material 6061 aluminum

DRIVETRAIN
Type Open gearbox with direct shaft drive
Primary 18T pinion or clutchbell/81T spur gear
Transmission ratio 2.5:1
Final drive ratio 11.25:1
Driveshafts Universal center drive with dogbones
Differentials Ball with plastic outdrives
Bearing type Rubber-sealed ball bearings

SUSPENSION
Type 4-link
Shocks Plastic-body with dual O-ring seals

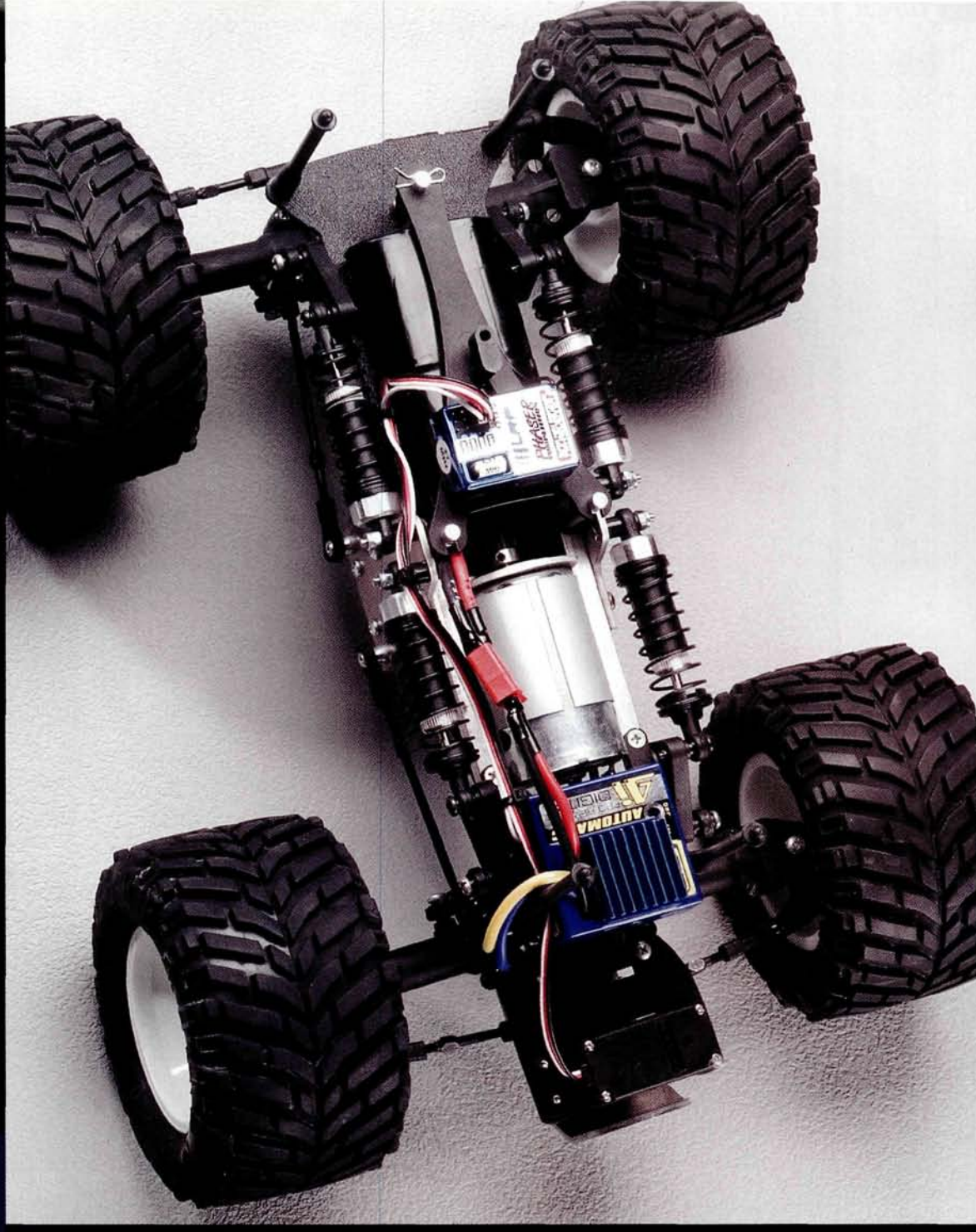
WHEELS
Type One-piece 5-spoke plastic

TIRES
Type IMEX Claw Dawg

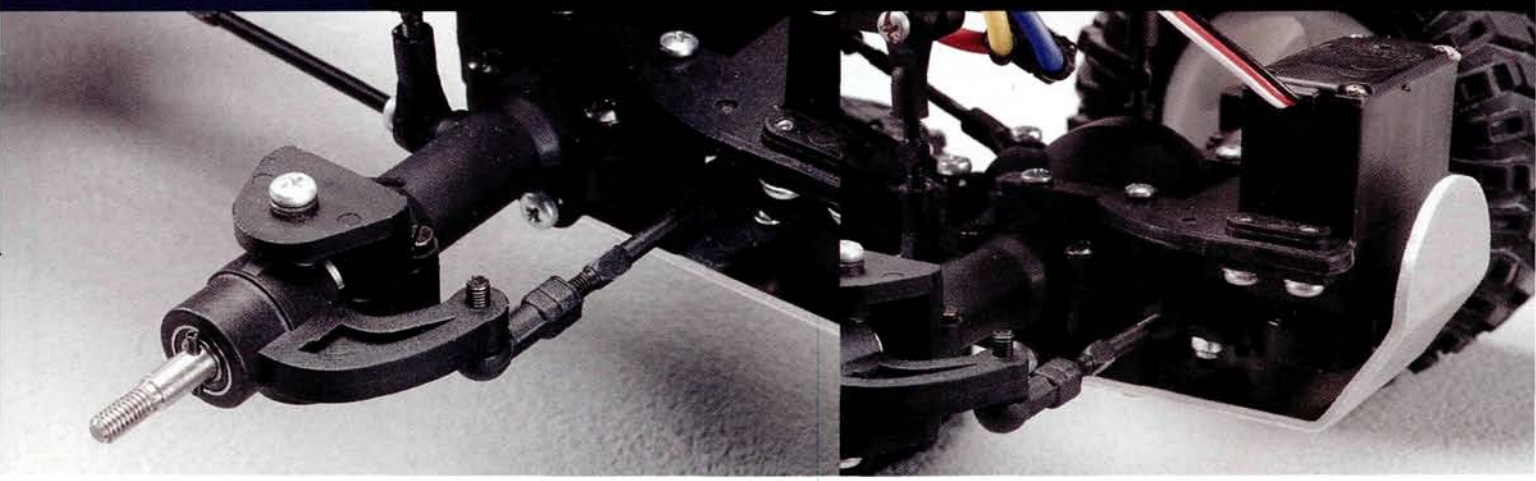
ELECTRONICS
Transmitter/receiver Not included
Servo(s) Not included
Speed control Not included
Motor 550 with torque ring
Battery Not included
Receiver pack Not included

FACTORY OPTIONS

- Carbon-fiber side plates – item no. 20309CF
- Aluminum cantilever–20304
- 4-wheel steering kit–20351
- Cooling motor plate–20355



Below left: adjustable links allow you to easily adjust front and rear toe. Rubber-sealed ball bearings support the gears in the drivetrain. **Below right:** the servo is mounted upside down on a molded plastic mount, and four screws attach it to the axle. An aluminum skidplate protects the servo and axle from hits.



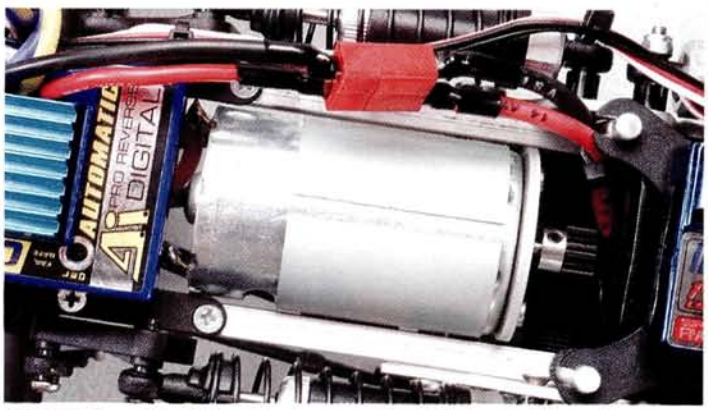
THE COMPETITION

GOLIATH

- Tamiya TLT-1 » 5/04
- Team Associated RC18MT
- Venom Mini Giant
- Schumacher Mini Monster
- Thunder Tiger ZK-2
- DuraTrax Mini Quake » 2/05

BODY, WHEELS AND TIRES. A good-looking PTI body covers the Goliath's workings. The body comes covered with overspray film, and the included window masks make it easy to cover the windows before the paint flies. The included sticker sheet features window detail, grills and lights. IMEX Claw Dawg tires are included along with RPM chrome wheels (my early production truck came with white wheels).

IMEX tires provide good traction on just about any surface.



PTI includes a big 550 motor to power the little truck. It has a torque ring and cooling fins inside to help increase performance.

INCLUDED ELECTRONICS. The Goliath comes with a 550 motor with torque ring. A ring of fins is attached to the end of the armature, and that helps lower the motor's operating temperature.

LIKES

- Scale monster truck looks.
- Smooth ball diffs.
- It's fast.

DISLIKES

- The finish on some of the aluminum parts could be better.
- Steering ball cups and hubs bind.

YOU'LL NEED	WE USED
Transmitter	Futaba 2PH
Speed control	LRP A.I. Pro Reverse
Steering servo	Futaba S3003
5-cell battery pack	PTI
Charger	MRC Super Brain 949
Tire glue	Pro-Line Premium Blend CA

FIND IT

» Go to page 219 for manufacturers' contact information

PERFORMANCE

Before I could bring the truck over to the studio for photos, I had the pack plugged in and the radio on. Why carry it there when I could drive it? The truck is very responsive on carpet. It didn't take much to get the truck to turn, and it didn't take long for me to flip it over. I wasn't surprised that it did flip over because the battery and motor (which are the heaviest things on the truck) are mounted so high in the chassis and not having a swaybar doesn't help things. The weight of the battery and motor is just thrown from side to side with every turn of the steering wheel, so I shut the truck off before I could wreck it and waited for the photos to be finished.

I took the Goliath out to the baseball field for testing. Driving the truck on anything but carpet is much more fun because I didn't have to worry about the excessive traction. The truck didn't roll as easily outside because the tires were able to slide a little, but body lean was still a little excessive, thanks to the missing swaybars. It didn't hurt the truck's performance much; it just looked strange. I was disappointed in the Goliath's top speed; it barely cracked 12mph despite 550 motor power. I'll experiment with the gearing (it seems high), but I think a competition stock motor or a 19-turn would be the ticket. The Goliath would be more fun with a little more speed.

It didn't take me long to find something for the truck to climb. Solid-axle trucks are great at climbing, and this truck not only has solid axles but also tires with good traction. I was able to climb over low curbs and small rocks without any trouble. If an obstacle gave the truck a hard time, all I had to do was mash the throttle more and up it went.

I wanted to see how well the truck jumped, so I broke out our plastic BMX ramp. The truck flew through the air with level flight and landed with a bounce. When I was putting the truck together, I noticed that the suspension felt stiff, and that flaw really showed itself when driving over rough ground as the Goliath bounced around with little suspension action. But to its credit, the little truck stayed upright. I worked my way over to the baseball diamond for some time in the dirt. When I goosed the throttle, the tires lit up. After a while, I was able to get a little 4-wheel drift action going. Then I heard a strange noise coming from the truck. After a little inspection, I found a small rock had worked its way into the spur gear—the Goliath's exposed gear mesh is prone to that sort of thing. I grabbed my hobby knife, plucked it out and went back to playing.

> "This truck not only has solid axles but also tires with good traction and a powerful motor. I was able to climb over curbs and small rocks without any trouble.

THE VERDICT

Considering it is PTI's first attempt at a truck of any size, the Goliath isn't bad, and it has the potential to be great. The binding steering links and stiff suspension are problems that should be easily solved. In fact, my next "Monster Shop" project is going to be a high-performance Goliath buildup. Then we'll see what this little monster can really do. ■

RATINGS

Instructions	9	The photo-illustrated manual is easy to follow.
Parts fit & finish	7	The aluminum chassis rails could have a better finish. The axles required minor trimming.
Turn-in	8	Great if you're on a high-traction surface, but could use an improvement in the dirt.
Corner speed	8	There is a slight push when on power.
On-power steering	7	Be careful with this one; the high CG makes it easy to flip.
Bump handling	7	Forgivably bouncy for a solid-axle truck, but the suspension could operate more freely.
Jumping	8	The Goliath flies through the air with level flight but bounces on landings.

Best buyer››› Mini-monster fans with a little building experience.

ADVANCED LITHIUM BATTERY CHARGER
WITH CELL BALANCING TECHNOLOGY
Scorpion 2s
FORM PACK
AMPS
FAST CHARGE
TOP OFF
FMA Direct

Future Tech

Lithium Polymer Power

We test the new tech with the FMA Direct Scorpion 2s charger & Li-poly packs

BY GEORGE M. GONZALEZ | PHOTOS BY DERON NEBLETT

A new battery technology will soon have a huge impact on RC. Lithium-polymer (Li-poly) batteries represent the latest advances in rechargeable-battery technology. Although computer, cell phone and other electronics manufacturers are already exploiting this new technology, no manufacturer has yet offered Li-poly batteries designed to compete with the NiMH cells that now dominate the RC car market—until now.

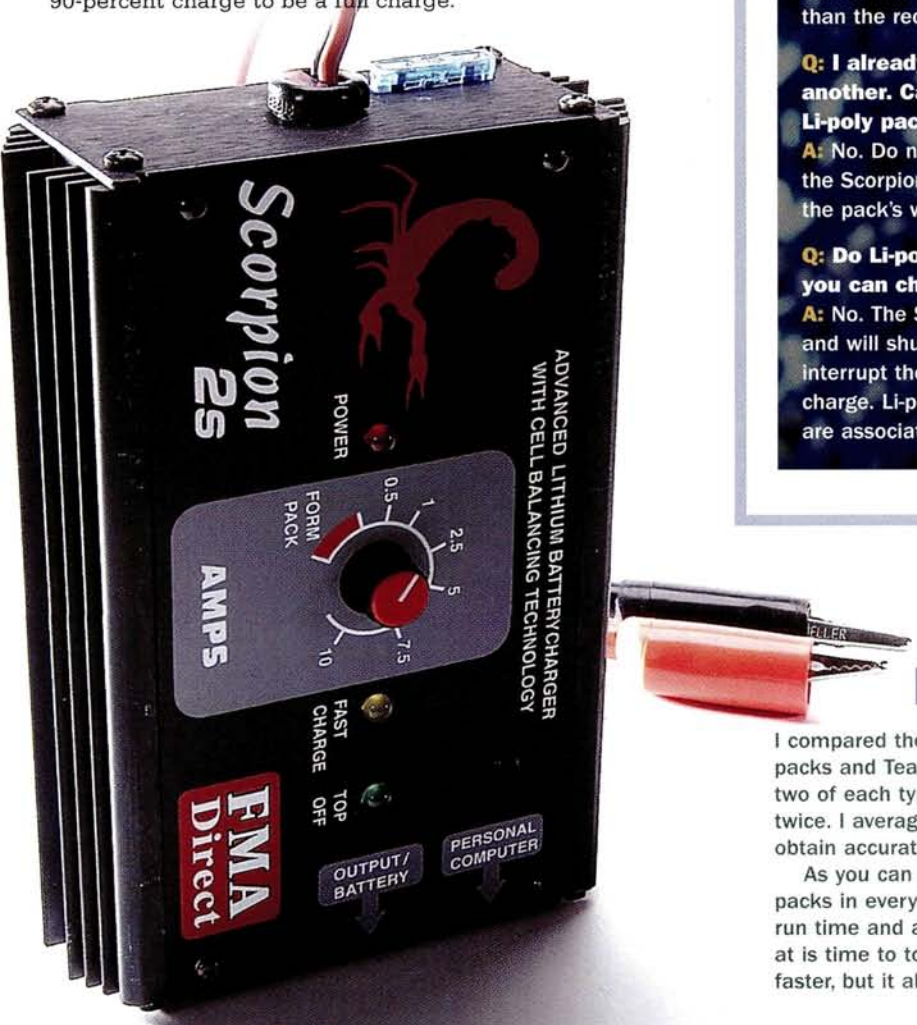
To test a complete Li-poly system, we used the only complete battery and charger system designed specifically for RC cars. FMA Direct and EP Kokam worked together to make the system easy to use and car-friendly. Li-poly packs offer huge advantages. The Li-poly packs can be charged in about 20 minutes, and they provide more punch, higher top speed and longer run times than NiMHs. They can be charged dozens of times without a noticeable loss in performance. Li-polys are also more than 6 ounces lighter than typical 6-cell stick packs. Sound too good to be true? Let's put this new battery technology to the test.

Inside the FMA Scorpion 2s charger

The Scorpion 2s is designed to charge Li-poly cells quickly and safely using "cell balancing" technology. The charger checks the voltage and charge current going into each cell many times every second to ensure that the cells are matched to within hundredths of a volt when the charge cycle has been completed.

The charger is easy to use. It's DC-only, so first, you have to connect it to an 11 to 15V power supply. A red LED lights up to let you know that the charger is ready to go, and a replaceable 15A fuse will protect the charger from reverse-polarity damage if you connect it to a power supply backwards. I tested this feature accidentally and soon had a blown fuse—much better than a blown charger. To charge the pack, simply plug its connector into a port on the right side of the charger. The yellow "fast-charge" LED will light up to indicate that the charge cycle is about to begin. A dial lets you adjust the charge rate from .05 amp to 10 amps. To charge the 3200mAh Li-poly pack, dial in a charge rate of 9.6 amps for a "3C" charge rate (that's Li-poly-speak; see "What is a C rate?") and then sit back and let the Scorpion 2s do the rest.

Early in the charge cycle, the yellow LED glows brightly and the green "top-off" light flashes slowly. After about 20 minutes, the green light flashes quickly as the pack nears 90-percent capacity, and it stays on at 100-percent charged. It can take up to an hour or more to charge the pack to 100-percent capacity, but you'll find that even at 90 percent, the Scorpion Li-polys will provide more run time and punch than a fully peaked 3300 NiMH pack. In fact, FMA Direct says that for maximum battery life, you should consider a 90-percent charge to be a full charge.



Li-poly battery benefits at a glance

Li-poly packs ...

- Can be charged in approximately 20 minutes.
- Have lower internal resistance than NiMH cells, and that means greater punch.
- Can be charged dozens of times without any loss in performance.
- Can handle super-high amp-draw applications.
- Yield higher voltages throughout the entire run for greater punch and top speed.
- Weigh 6 ounces less than typical 7.2V stick packs.
- Can be stored for long periods without damage.
- Do not require cycling or dead shorting to provide optimum performance.
- Are far more cost-effective than NiMH packs.
- Are safe and easy to use.

Li-poly FAQ

Q: Can Li-poly packs be charged with a charger designed for Ni-Cd and NiMH packs?
A: No. You must use a designated Li-poly charger. Using any other kind of charger will damage the pack and probably cause property damage and personal harm.

Q: Can Li-poly packs blow up or start a fire?
A: Any type of battery can cause a fire if it is shorted out while it's being charged, but there is a misconception that Li-poly cells are prone to spontaneous, rapid failure—complete with flames. This sort of catastrophic failure can occur if the pack is over-charged, and that is why it's important to use a Li-poly charger. As long as you use the right equipment, Li-poly packs are no more dangerous than the rechargeable cells you're used to.

Q: I already have a Li-poly charger and don't want to buy another. Can I use the one I have to charge a Scorpion Li-poly pack using a Dean's plug instead of the charge lead?
A: No. Do not use any charger other than the Scorpion 2s to charge the Scorpion Li-poly pack or you'll harm its performance and void the pack's warranty.

Q: Do Li-poly packs have to be completely discharged before you can charge them again?
A: No. The Scorpion 2s charger will detect the voltage in the cells and will shut down when the pack is fully charged. You can also interrupt the charge cycle when the LEDs indicate a 90-percent charge. Li-poly cells do not suffer from the "memory" problems that are associated with Ni-Cd cells.

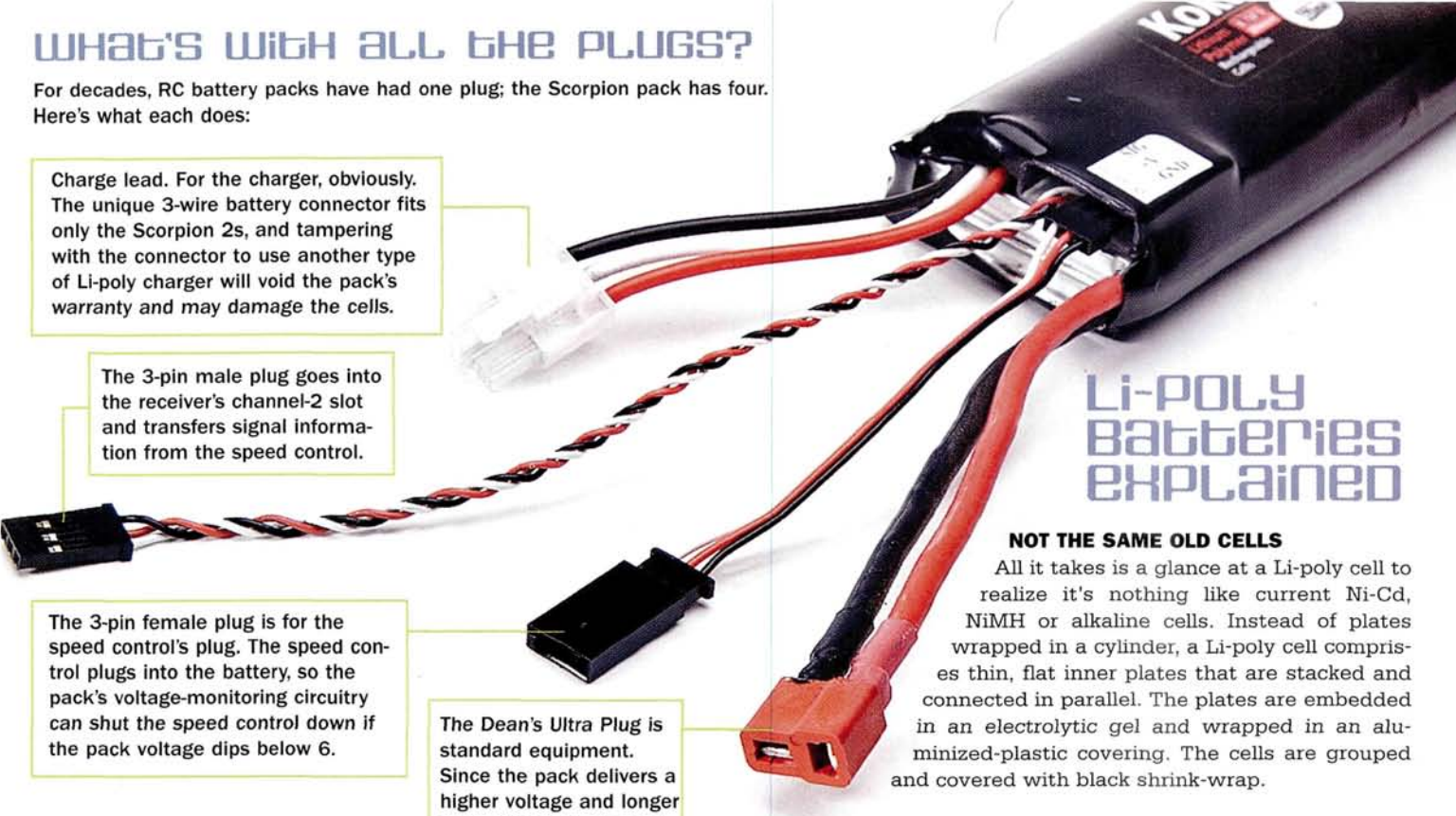
Run time & speed

I compared the performance of the Scorpion 7.2V 3200mAh Li-poly packs and Team Orion's Power Plant GP 3300 NiMH stick packs. I used two of each type of pack, and I ran each in my TC4 RTR test vehicle twice. I averaged the run times, top speeds and time-to-top-speed info to obtain accurate data from a few runs.

As you can see in the chart, the Li-poly packs outperformed the NiMH packs in every category. The Li-poly packs gave a 16-percent increase in run time and a 10-percent gain in top speed. The important data to look at is time to top speed because the Li-poly powered TC4 was not only faster, but it also reached top speed in half the time.

WHAT'S WITH ALL THE PLUGS?

For decades, RC battery packs have had one plug; the Scorpion pack has four. Here's what each does:



Charge lead. For the charger, obviously. The unique 3-wire battery connector fits only the Scorpion 2s, and tampering with the connector to use another type of Li-poly charger will void the pack's warranty and may damage the cells.

The 3-pin male plug goes into the receiver's channel-2 slot and transfers signal information from the speed control.

The 3-pin female plug is for the speed control's plug. The speed control plugs into the battery, so the pack's voltage-monitoring circuitry can shut the speed control down if the pack voltage dips below 6.

The Dean's Ultra Plug is standard equipment. Since the pack delivers a higher voltage and longer run times than a typical pack, a Tamiya-style plug isn't a good choice.

What is "C rate"?

"C rate" is basically the amount of current a pack provides under a load, and it's described as a multiple of its capacity. For instance, a Li-poly 7.4V 3200mAh battery pack yields 3.2 amp-hours of current. The pack's capacity is described by the letter "C." A 1C discharge rate would drain the battery at a consistent 3.2 amps and take one hour to dump. A 10C discharge rate equals the pack's amp hours multiplied by 10. In this case, 3.2x10 = 32, so "10C" equals a 32A discharge rate, which would dump the pack in less than 6 minutes. The Scorpion 7.4V 3200 pack is rated at a 20C discharge rate—equal to 64 amps continuous—but the pack can handle momentary bursts of 40C, or 128 amps. It would take less than 3 minutes to discharge the pack at 64 amps; even the most powerful modified motors can't pull this kind of amperage, so the Li-poly packs are plenty strong enough for RC car use.

COMPARISONS

These are significant numbers, and you can expect your vehicle's top speed and time to top speed to increase exponentially with a more powerful motor than the 15-turn I used for my tests. Also important is that the Li-poly packs were charged to 90 percent capacity as recommended by FMA Direct.

Battery type	Weight	Run time	Top speed	Time to top speed
GP 3300 NiMH	405g	22.11 min.	23.1mph	5.9 sec.
Scorpion 3200 Li-poly	218g	24.30 min.	26.8mph	3.1 sec.

Li-POLY Batteries explained

NOT THE SAME OLD CELLS

All it takes is a glance at a Li-poly cell to realize it's nothing like current Ni-Cd, NiMH or alkaline cells. Instead of plates wrapped in a cylinder, a Li-poly cell comprises thin, flat inner plates that are stacked and connected in parallel. The plates are embedded in an electrolytic gel and wrapped in an aluminized-plastic covering. The cells are grouped and covered with black shrink-wrap.

MORE POWER, LESS RESISTANCE

Li-poly cells have a nominal, no-load voltage of 3.7 volts. The Scorpion 3200mAh pack has just two cells wired in series, but since each is good for 3.7 volts, that's 7.4 volts total. And that's nominal voltage; a fully charged pack yields 4.2 volts per cell, or 8.4 volts for a 2-cell pack. The Scorpion 7.4V, 3200mAh Li-poly packs use the latest "super-high-discharge" cells; they are designed to be charged and discharged at much higher amp rates than any other type of available cells. Using the FMA Scorpion 2s charger's fast 9.5A charge current, Scorpion packs can be charged to 90 percent capacity (2880mAh; more on this later) in about 20 minutes. That's half as long as it takes to peak a 3300mAh NiMH battery pack at 5 amps! Scorpion packs are rated at a 20C discharge, which means they can handle a continuous discharge rate of 64 amps and momentary bursts of up to 40C or 128 amps. More voltage equals more punch, but if a pack has a high internal resistance, it can't perform well. According to FMA direct, their Li-poly cells have a much lower internal resistance than any other type of cell, and the internal resistance does not increase (even after more than 100 charge/discharge cycles). Scorpion Li-polys can be stored for many months and will still retain 90 percent of the charge that was left in them. This is a huge benefit, because nothing does more damage to a NiMH battery pack than not being used. Additionally, a Scorpion 7.4V pack weighs 7.8 ounces (218 grams); a typical 7.2V stick pack tips the scales at 14.5 ounces (405 grams). That's a whopping 6.7-ounce weight savings! You'd have to do a lot of chassis grinding to remove that kind of weight. You don't have to be a rocket scientist to realize that a battery that is 6 ounces lighter and has more voltage and less internal resistance can make car go faster, corner more quickly and stop faster than a heavier car with a less powerful battery.

DANGER-PROOF DISCHARGING

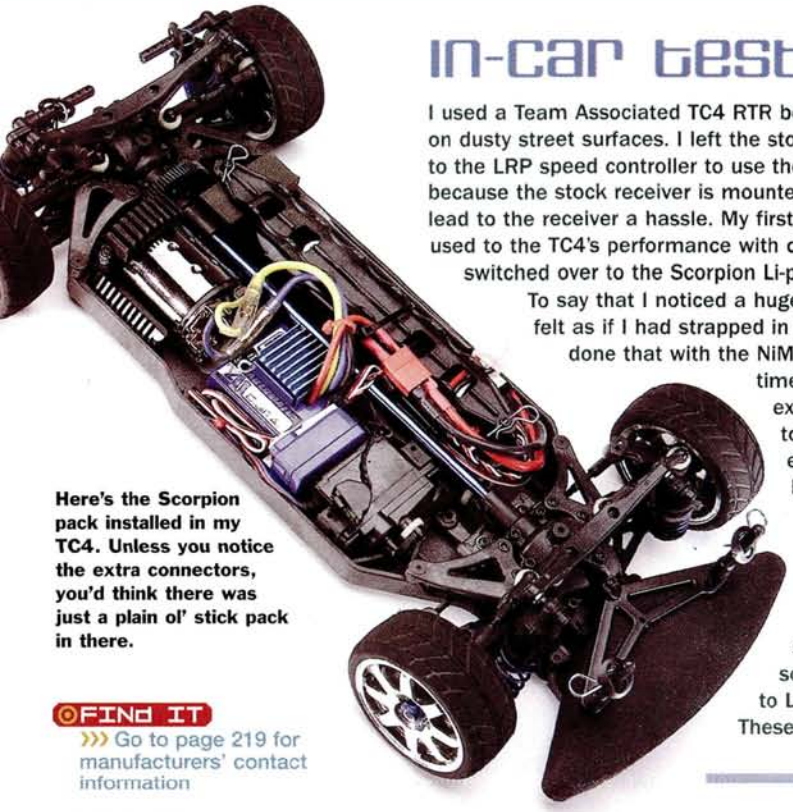
Li-poly cells can be damaged if they're over-discharged. For this reason, Scorpion packs have a built-in voltage cutoff circuit that cuts power to the motor when the voltage drops below 6.

In-car testing

I used a Team Associated TC4 RTR because it's popular, and its 4WD system provides excellent traction on dusty street surfaces. I left the stock 15-turn motor installed, but I had to solder a Dean's Ultra Plug to the LRP speed controller to use the Li-poly packs. I also installed a KO Propo receiver-plug extender because the stock receiver is mounted on its side, and that makes connecting the pack's channel-2 lead to the receiver a hassle. My first runs were with the GP 3300 NiMH packs because I wanted to get used to the TC4's performance with conventional cells. After a couple of runs with the NiMH packs, I switched over to the Scorpion Li-poly packs.

To say that I noticed a huge increase in performance would be an understatement. The car felt as if I had strapped in a motor with fewer winds. The TC4 lit up all four tires (it hadn't done that with the NiMH packs) and spooled up to top speed in half the time (see "Run time and speed comparison"). The TC4 had no problem handling the extra power, but it felt like a completely different vehicle. I was able to break the tires free in the corners and do controlled drifts with ease. I noticed more tire squeal as well because the car carried a lot more speed in the corners.

What impressed me most was that the car felt punchy throughout the entire run, although the pack's internal cutoff chip started to kick in, and the throttle cut out momentarily as the pack's energy was depleted. The car stopped in its tracks less than a minute afterward, but I was still able to drive it back slowly after letting it sit for a few seconds to let the pack recover some voltage. I did several back-to-back runs switching from NiMH to Li-poly packs, and I always noticed a big boost in performance. These Li-polys rock!



Here's the Scorpion pack installed in my TC4. Unless you notice the extra connectors, you'd think there was just a plain ol' stick pack in there.

FIND IT
>>> Go to page 219 for manufacturers' contact information

THE VERDICT

FMA and EP Kokam are on the forefront of Li-poly technology and have put together a battery and charging system for RC cars that outperforms the best NiMH matched packs. Li-poly packs operate with less internal resistance and yield higher average discharge voltages than NiMH cells; this means increased acceleration, top speed and run time. At half the weight of conventional stick packs, Li-poly packs will give your motor less of a workout while providing more speed. We are witnessing a milestone in battery technology. I don't know about you, but I'm convinced that Li-poly technology gives electric a much needed boost. ■

BY GEORGE M. GONZALEZ & JASON SAMS | PHOTOS BY PETE HALL & JASON SAMS

TEAM LOSI MINI-T PRO VS.

WHO'S THE TOP

Losi and Associated battle for micro supremacy

Anytime Team Associated and Team Losi are in the same category, it's only natural to pit the brands against each other. They battle it out with buggies, trucks and sedans—nitro and electric—and now they're going toe to toe with rival mini-trucks. Team Losi created the category with the 2WD Mini-T, and Associated answered with the 4WD RC18T. And now that both are offered in high-performance, race-prepped versions—"Pro" for Losi, "Factory Team" for Associated—we decided it was high time for a head-to-head between RC's mightiest mini-trucks.

ASSOCIATED FACTORY TEAM RC18T

DAWG?

TEAM ASSOCIATED FACTORY TEAM RC18T

QUICK SPECS

PRICE: $140
NOT INCLUDED: motor, battery pack, charger, speed control, servo, radio system.
TOP SPEED: 25.6mph

HITS

>> Threaded-body shocks.
>> Includes 3 steel pinion gears.
>> Identical front and rear suspension arms (fewer spare parts to stock).
>> You get to build it.

MISSES

>> Open gear mesh can be fouled by debris.
>> Front suspension has noticeable bump-steer.

FACTORY TEAM TREATMENT

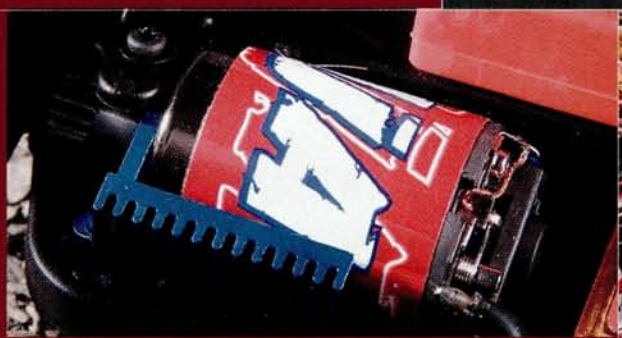
>> Threaded-body aluminum shocks
>> Titanium turnbuckles
>> Graphite battery strap
>> Lightweight aluminum dogbones
>> Carbide-steel diff balls
>> Aluminum heat-sink motor mount
>> 3 steel pinion gears
>> Blue-anodized aluminum wheel nuts
>> Universal servo-saver system
>> Aluminum motor-mount gasket

FACTORY TEAM RC18T FEATURES

>> Shaft-driven 4WD
>> Front and rear ball diffs
>> Adjustable turnbuckles
>> Mini-stud tires
>> Semi-tub molded chassis
>> Captured hingepins (no E-clips)
>> Symmetrical front and rear suspension arms
>> 6-cell in-line battery mounting
>> Steel pinion gear
>> Aluminum motor mount

The RC18T RTR is fast and handles great right out of the box, but the Factory Team treatment takes it to the next level, and you get to put it together yourself. This is a bonus to racers who prefer to build their own gear and install the electronics of their choice. The shaft-driven 4WD system provides greater control on loose surfaces, and the truck includes just about every Factory Team option, making it a great value, too.

The lightweight, blue-anodized-aluminum dogbones look cool and improve acceleration. The threaded-aluminum shocks allow quick and easy ride-height adjustment.



The motor is strapped to a blue-anodized aluminum heat-sink motor mount. The mount helps dissipate motor heat, and changing pinion gears is easy: just loosen three screws and slide the mount away from the spur gear. Three steel pinion gears are included with the kit.

The battery pack is held securely by a graphite battery strap. The weight of the battery pack is balanced by the motor, speed control and steering servo that are mounted on the other side of the chassis.

PRO TREATMENT

- >> Hard-coated aluminum shocks
- >> Titanium turnbuckles
- >> Dual-disc slipper clutch
- >> Adjustable ball diff
- >> MIP CVD driveshafts
- >> Team Losi step-pin rear tires
- >> Lexan gear cover with slipper access
- >> Universal servo-saver system
- >> Complete ball-bearing set
- >> Mini-T Fury body
- >> Hotter motor
- >> Plastic pinion-gear set

TEAM LOSI MINI-T PRO

QUICK SPECS

PRICE: $149
NOT INCLUDED: battery pack, battery charger, speed control, servo, radio system.
TOP SPEED: 24.4mph

MINI-T PRO FEATURES

- >> Sealed 3-gear tranny
- >> Semi-tub molded chassis
- >> Front and rear steel hingepin braces
- >> Long-travel suspension
- >> Fore and aft battery adjustment
- >> In-line motor, servo and electronics mounting
- >> Angled steering bellcranks for reduced bump-steer
- >> In-line steering kingpins
- >> Modular design
- >> Aluminum motor mount

HITS

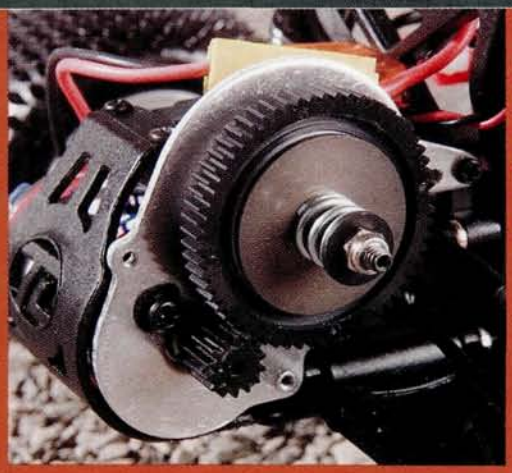
- >> Dual-disc slipper clutch.
- >> Long-travel suspension (for a mini truck).
- >> MIP CVD driveshafts.
- >> High-performance motor.

MISSES

- >> Shocks require extra attention to make them leak-proof.
- >> Should include stiffer springs.

The Mini-T Pro includes all of the Team Losi factory hop-up parts, and it arrives fully assembled. The motor is about twice as fast as the motor that comes with the Mini-T RTR, and it can handle the power of a 6-cell battery pack. The modular design makes wrenching on it easy, and you can paint the clear Lexan body as you please. The Mini-T Pro is basically a scaled-down version of the national champion Triple-XT race truck, and its many adjustment options allow you to fine-tune the Mini-T Pro to just about any track.

The suspension is just as adjustable as a Triple-XT's. Check out the hard-coated aluminum shocks with titanium-nitride shock shafts and the ball bearings in the wheel hubs—"Pro" exclusives.



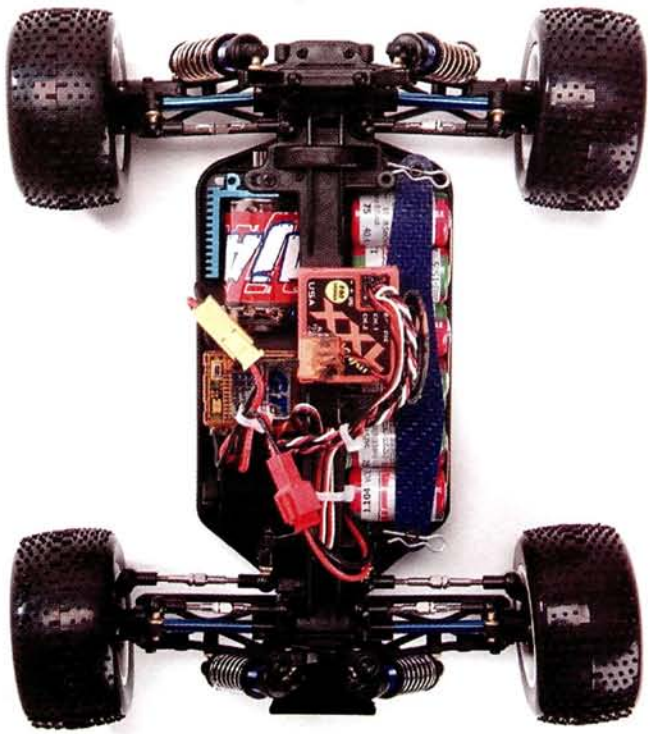
The dual-disc slipper clutch provides drivetrain protection and traction control. The pinion is a press-on plastic part.

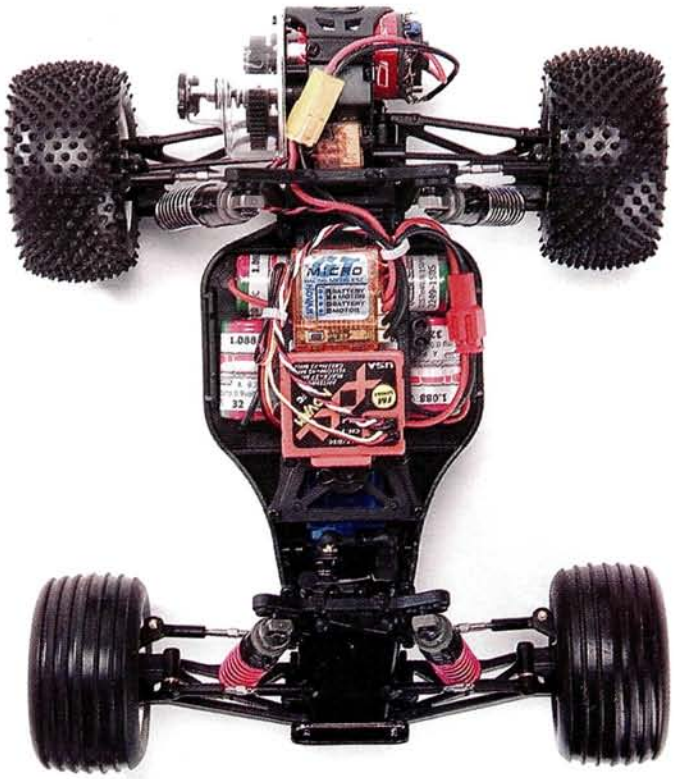
There's plenty of room for the speed control and receiver on the pivoting battery strap. The battery pack can be moved forwards or rearwards to alter the truck's steering characteristics.

RC18T

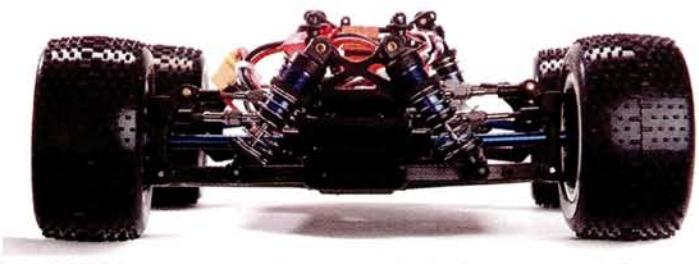
SIDE BY SIDE

MINI-T

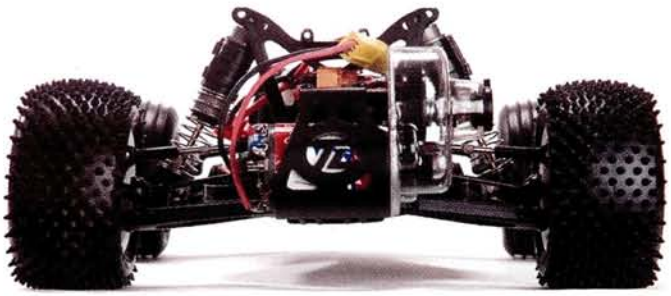




The FT RC18T has a longer wheelbase than the Mini-T Pro, and that helps stability. The Pro's shorter wheelbase provides a tighter steering radius, and that means less push.



The Mini-T has more nose clearance, and the front bumper is farther behind the front wheels than the RC18T's is. This prevents the front end from digging into the ground when going through the rough stuff and when nose-diving off jumps. The RC18T's threaded-body shocks make preload adjustment easy.



With the shocks fully extended, the Mini-T has a little more downtravel than the RC18T. The rear-mounted motor puts more weight on the rear tires for better traction, but it makes the Mini-T Pro more susceptible to bottoming out.

SPECIFICATIONS

	FACTORY TEAM RC18T	MINI-T PRO
Wheelbase	6.06 in. (154mm)	5.6 in. (142mm)
Width	7.16 in. (182mm)	7 in. (178mm)
Weight, as tested	20.3 oz. (575g)	20.4 oz. (578g)
Front shock positions (upper/lower)	3/1	3/2
Rear shock positions (upper/lower)	3/1	3/3
Front camber-link positions	1	2
Rear camber-link positions	1	2
Vertical ball studs	Inner front & rear	Inner front
Shock bodies	Threaded aluminum	Aluminum
Shock shafts	Standard	Titanium-nitride
Turnbuckle type	Titanium	Titanium
Transmission ratio	2.5:1	2.7:1
Slipper clutch	No	Yes
Spur gear	55T	60T
Pinion gear	13, 14, 15 (steel)	12, 13, 14 (plastic)
Drive axles	Aluminum dogbones	MIP CVDs
Ball-bearing type	Metal-shielded	Metal-shielded
Included tires (front)	Associated mini-block	Losi 5-row ribs
Included tires (rear)	Associated mini-block	Losi step-pin
Price (varies with dealer)	$140	$149

TEST GEAR

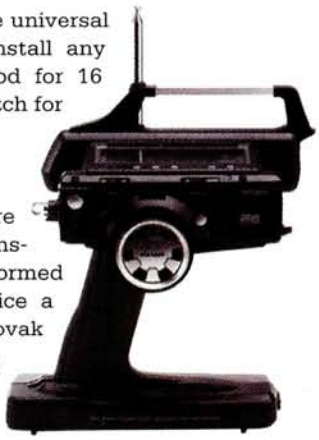
TEAM ORION MAX-PLUS RDS GP 1100 MATCHED CELLS AND BAJA MODIFIED MOTORS

Orion's matched 1100mAh cells require assembly, but the Team Orion Mini Copper Battery Bones (not included) make it easy; they're just the right size for the tiny cells. The battery boost went along with a matched set of Orion's Baja modified motors. The little mills provide tremendous torque and rpm—enough to scoot the trucks along at well over 20mph. The Baja motors have replaceable brushes, and you can adjust motor timing as well.

NOVAK MICRO GT SPEED CONTROL AND XXL RECEIVER

The Micro GT is a serious forward-only racing unit and features the same high-performance, surface-mounted technology as the world champion Novak GTX racing speed control and many of its features, including One-Touch Set-Up, radio priority circuitry, thermal-overload protection and cool-running Polar Drive technology. We also equipped the trucks with Novak XXL receivers, which we chose for their small size and excellent reliability.

HITEC HS-55 SERVOS



The Mini-T and RC18T both include universal servo-savers that allow you to install any brand of servo. The HS-55 is good for 16 oz.-in. of torque, and it's a good match for any micro machine.

AIRTRONICS M8 RADIO SYSTEM

The settings for each truck were stored on an Airtronics M8 transmitter. As always, the M8 performed flawlessly, and we didn't notice a single glitch. Our M8 has a Novak switch-synthesized module, so we didn't have to mess with transmitter crystals.

RACE PLACE

We tested the trucks at Hot Rod Hobbies in Saugus, CA. The tight, technical, outdoor off-road track is designed for larger, 1/10 vehicles. The track still had the layout from the Hot Rod Hobbies Off-Road Shootout, so there were plenty of ruts and bumps on its hard-packed surface. We tried to stay clear of the rough stuff, but it was just plain unavoidable, and the trucks had a real workout. The track features a high-speed sweeper, plenty of tight corners and jumps everywhere. Surprisingly, the little trucks cleared many of the jumps, and we put down decent lap times.

TEST FORMULA

Lap times were recorded with an AMB race system. The trucks were run on the same track at the same time, and both were equipped with identical racing electronics. The Mini-T Pro arrived fully assembled and required only that we fill the shocks with oil and install the radio system, the speed control and the motor. The Factory Team RC18T comes as an unassembled kit, and we built it according to the manual's specs. Both trucks include race-worthy tires, and we decided to use them to reveal the trucks' true out-of-the-box capabilities.

SCOREBOARD

Factory Team RC18T

	GEORGE	JASON
Acceleration	9	9
Turn-in	7.5	7.5
Transitional handling	9	7.5
Corner speed	9	8.5
Bump handling	7	6.5
Jumping	8	7.5
Total score	49.5	46.5
Total combined scores	96	

Mini-T PRO

	GEORGE	JASON
Acceleration	8	8
Turn-in	8	8.5
Transitional handling	8	8
Corner speed	8	8.5
Bump handling	9	9
Jumping	9	9
Total score	50	51
Total combined scores	101	

ON THE TRACK

LAP TIMES	RC18T		MINI-T	
Driver	Best lap	Average lap	Best lap	Average lap
George	33.4	34.5	33.78	35.43
Jason	29.94	31.72	29.88	31.56

DRIVER NOTES

RC18T

GEORGE

There was no getting around its 4WD advantage; the FT 18T accelerated faster and carried more speed in the corners. It had a noticeable push in the sharper turns, but letting off the throttle and immediately getting back on it made it turn in harder. The FT 18T felt more planted coming out of the corners, and spinouts were less frequent. The extra traction gave me the confidence to push the truck to the limit, and my lap times improved as a result.

JASON

I wasn't surprised that the FT 18T accelerated a little better than the Mini-T Pro or that it carried more speed in the sweepers; after all, it's 4WD. I was surprised by how bucked around it got when it went through the track's bumpy sections. It occasionally flipped and got spun around. This made it difficult to put in consistent laps. We ran them "box stock" for this head-to-head. Otherwise, we would have tweaked the suspension to find better setups. The FT 18T pushed a little in tight corners, but while coasting, steering was adequate. The truck jumped well with a slightly nose-down attitude. Overall, it did many things well, but it just didn't feel as planted as the Pro did.

MINI-T PRO

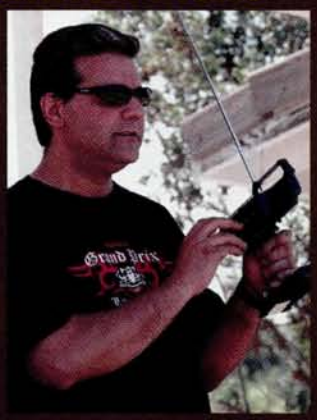
GEORGE

The Mini-T Pro handled the rough track better than the Factory Team RC18T. It flew over bumps that made the FT 18T swap ends or endo. The Pro also felt less twitchy in the jumps; it took to the air nice and flat, and its landings were smoother and more controlled. With its shorter wheelbase and no-drive front tires, the Pro turned in harder, and it rotated more freely in the corners than the FT 18T.

JASON

Some might say 4WD versus 2WD is an apples-to-oranges comparison and doesn't give the Mini-T Pro much of a chance. But the Pro spoke for itself on the racetrack. I admit I was a little skeptical at first, but when the Pro took to the blown-out track with its many ruts and cracks, I was impressed. It went over bumps without getting too tripped up. It steered really well and jumped flat and level. It was much easier to drive and control than the FT 18T. The only section on which the Pro wasn't on par or better than the FT 18T was the high-speed sweepers where 4WD is certainly an advantage. Because the Mini Pro did much better in the bumps, and it jumped better. I was able to get into a rhythm with it and throw down better lap times as a result.

DRIVER PICKS



GEORGE
Associated Factory Team RC18T

I thought that this was going to be a slam-dunk for the Factory Team RC18T, but it was much closer than I expected. The FT 18T was a little twitchy over the rough stuff, but its 4WD traction gave it more scoot, and it was easier to control in the corners. If the track hadn't been as bumpy, I think the numbers in the FT 18T column would have stacked up higher. I have to go with the FT 18T on this one, but I left the track with new respect for the Mini-T Pro.

JASON
Team Losi Mini-T Pro

Before track testing, I would have put money on the Factory Team RC18T being my winner. I thought the test would show that a 4WD truck would turn faster laps than a 2WD truck. I was surprised and impressed by the capable Mini-T Pro. It had much more traction than I expected, and it steered better than the FT 18T. The Pro truly shone in the rough; 1/10-scale ruts and bumps didn't unsettle it. The Pro gets my vote because it exceeded my expectations, posted faster lap times and was unexpectedly easier to drive.

THE WINNER

Even though we have different opinions, there is no getting around the numbers; the Mini-T Pro stacked up more points, so it wins. Congratulations, Team Losi! Look at the lap times, and you'll notice that Jason posted his fastest lap time with the Factory Team RC18T. His average lap times, however, were faster with the Pro. When it comes to racing, consistency is the key, and the Pro was more consistent than the FT 18T on this outdoor track. With a little suspension tuning, we could have improved the FT18T's lap times, but we wanted to compare the trucks' performances when set up according to their manufacturers' recommendations. The Mini-T Pro and Factory Team RC18T are excellent mini race trucks, and both can get you to the winners' circle. ■

Nomadio Sensor

RC TECHNOLOGY MAKES A QUANTUM LEAP FORWARD

NO MORE CRYSTALS, no more glitching and no more waiting for your frequency to be open at the track. Sound good to you? I bet it does, and if you're at all into RC, odds are, you caught wind of the Nomadio Sensor when it made its debut at the 2004 RCX show. Needless to say, this unique radio got a lot of attention, and while wasn't the first to the market, Nomadio was the first to officially announce 2.4GHz digital spread spectrum (DSS) technology for RC use. Sure, we've had crystal-less radios for some time now, but DSS means you'll never have to worry about which channel you or anybody else is on, and your equipment should be impervious to glitches. Ever since the Sensor was announced in the spring of 2004, we have all been waiting to get our hands on this revolutionary advances. The Sensor not only looks completely different from everything else, but it also has an impressive list of features not found on any other radio.

PHOTOS BY DERON NEBLETT

FEATURES

DIGITAL SPREAD SPECTRUM (DSS). This is the heart of the Sensor. Conventional radios operate on 27 or 75MHz; the Sensor operates at 2.4GHz (2400MHz) and uses direct sequencing spread spectrum (DSSS). Direct sequencing means that the Sensor locks on a channel within the 2.4GHz range and doesn't hop around the spectrum as a means of interference avoidance. Instead, each signal is coded, and all signals without the proper code are ignored. For more, see "So, what is DSS?" sidebar.

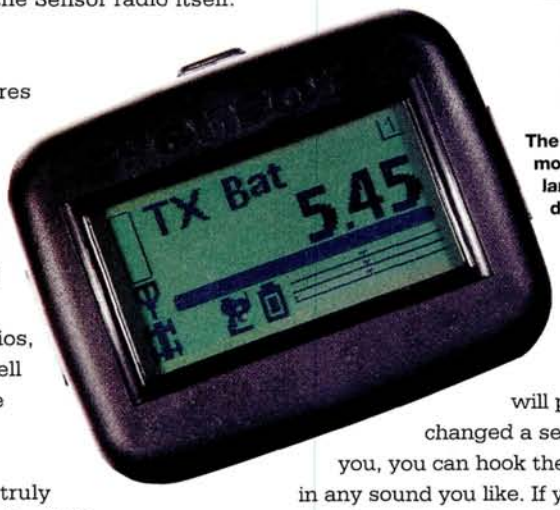
FULLY DIGITAL. Unlike a conventional radio outfitted with a bolt-on DSS unit, the Sensor's digital design negates the need for a conversion from analog to digital. Standard radios operate using an analog pulse that must be converted to a digital signal to be transmitted when using a bolt-on DSS unit; according to Nomadio, this process creates a delay.

PC-COMPATIBLE. The Sensor comes with a compact disc containing the Nomadio Digital RC Desktop software and a USB cable for connecting it to a PC. This allows you to adjust all of the Sensor's settings via your computer, exchange setups with other drivers and update the software in the Sensor radio itself. Note: the Sensor is not Mac-compatible.

EIGHT-MODEL MEMORY. The Sensor stores eight models in its memory. Each can be named via the computer interface.

ERGONOMIC DESIGN. Compared with the current lot, it might look funky, but the Sensor radio is as good an example of function over form that you'll ever find in RC. It certainly doesn't look like other radios, and it doesn't feel like other radios. It's well balanced and comfortable to hold, and the steering wheel is properly angled.

The large rubber buttons on the Sensor's main control panel are very easy to use.



The Sensor's LCD backlit screen is movable and has 128x64 pixels for large, easy-to-read numbers to be displayed.

MOVEABLE LCD SCREEN. This allows a truly ergonomic fit. Loosening two bolts allows the LCD backlit screen to be rotated so that you can easily see it, regardless of how you hold the radio. With 128x64 pixels, the screen allows large, easy-to-read numbers to be displayed.

ADAPTABLE FOR LEFT-HAND USE. The steering wheel and speaker can be swapped for left-hand use. The screen can also be rotated for easy viewing from the other side.

AUDIBLE CUES AND ALARMS. The Sensor can "talk" to you and has programmable alarms. So if you adjust trim on the fly, the radio will say "Trim" when the setting is at zero. While you're in the menu, the Sensor will play three notes to signal that you changed a setting. If the default jingles don't do it for you, you can hook the Sensor up to your computer and program in any sound you like. If you want Homer Simpson to burp when your batteries get low, it's only a few clicks on the Internet away. There's also a jack for headphones.

REAL-TIME TELEMETRY. The Sensor can send and receive information. To take advantage of this, the system is equipped with a transceiver instead of a traditional receiver that only receives information. The transceiver is used to send real-time telemetry back to the Sensor. The system includes three sensors: a temperature sensor, a speed sensor and a battery voltage sensor. Other sensors such as EGT and fuel level will be available as options.

VIBRATING HANDLE. In addition to sounds, the Sensor vibrates to alert you that your engine might be too hot or that you're changing your settings.

THREE-YEAR WARRANTY. According to Nomadio, the Sensor has been subjected to extensive durability tests, and the results merit an extended warranty. The Sensor is designed and built in the U.S.

MANUFACTURER'S SPECIFICATIONS

Sensor
- **Weight:** 674g
- **Dimensions:** 300x139x125mm
- **Latency:** 10 millisecond (max.), 5ms (typical)
- **Power output:** 75mW
- **Frame rate:** 100 frames per second
- **Servo channels:** 4
- **Screen resolution:** 128x64 pixels

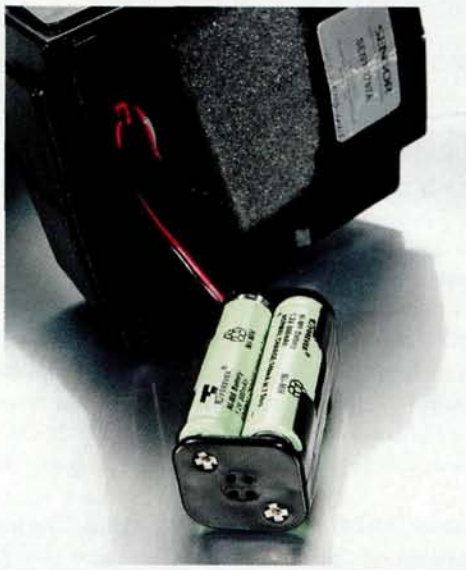
Transceiver
- **Dimensions:** 47.7x30.2x19mm
- **Weight:** 34g
- **Antenna length:** 22.8 cm
- **Antenna thickness:** 1.8mm

Price: $520—radio, transceiver, software, USB cable, three sensors, charger and NiMH batteries.

HOT LIST

The Sensor has all the features you'd expect in a high-end, race radio and then some ...

- 8-model memory
- Trim
- Endpoints (steering, throttle, brake, 3rd channel)
- Dual rate (steering, throttle, 3rd channel)
- Exponential (steering, throttle, brake)
- Subtrim
- Trim-adjustment increments
- Dual-rate adjustment increments
- Servo-reversing
- Servo type selection (analog or digital)
- 3rd-channel mode (toggle, hold, 4WS, off)
- Idle-up
- Autostart
- Anti-lock brakes
- RC model tank mode
- Mixing
- Fail-safe (steering, throttle, 3rd channel)
- Real-time telemetry
- Adjustable sounds, volume, vibration, backlight, contrast
- Timers (operation and lap)



Above: the Sensor uses a short, flexible antenna instead of the more typical telescoping metal piece.
Right, top to bottom:
■ the Sensor is a true two-way system, and as a result, it uses a transceiver instead of a traditional receiver. The extra slots are for the onboard telemetry.
■ With the rubber cover removed, you can see the headphone jack and USB port.
■ The Sensor uses 4 rechargeable 1.2V NiMH batteries (included). Nomadio also includes a charger.

OPERATION

Unlike most radios, the first thing you'll do when you get a Sensor is install the included CD; as long as you have a computer made sometime within the last decade, that's pretty easy. Once it's properly connected to your PC, you can access all of the Sensor's many adjustments. You can adjust or change the sounds the radio makes, name the models and tweak all of your typical settings. Seeing all of the steering adjustments on one screen at the same time makes a huge difference in terms of getting the Sensor just as you like it. Setting up anti-lock brakes was easy because all of the parameters are on a single screen. I'm not particularly computer-savvy, and I found the Sensor's PC software straightforward enough to use without reading the instructions. Using the Sensor is also rather uncomplicated. Like other computer radios, after just a few minutes of trial and error, navigation comes naturally. I did have some difficulty getting my computer to recognize that the Sensor was hooked up to the USB port, but a quick email to Nomadio solved the problem. The last step was to "bind" the Sensor to the transceiver. This is as simple as entering "Manage models" and following the prompts. I mounted the transceiver in my Team Associated T4, which has plenty of spare chassis real estate, but the unit is large enough to possibly make it tricky to mount on some of today's tight touring car platforms.

This is the steering-channel screen. Changing these settings via the computer allows me to view all of the adjustments at once.

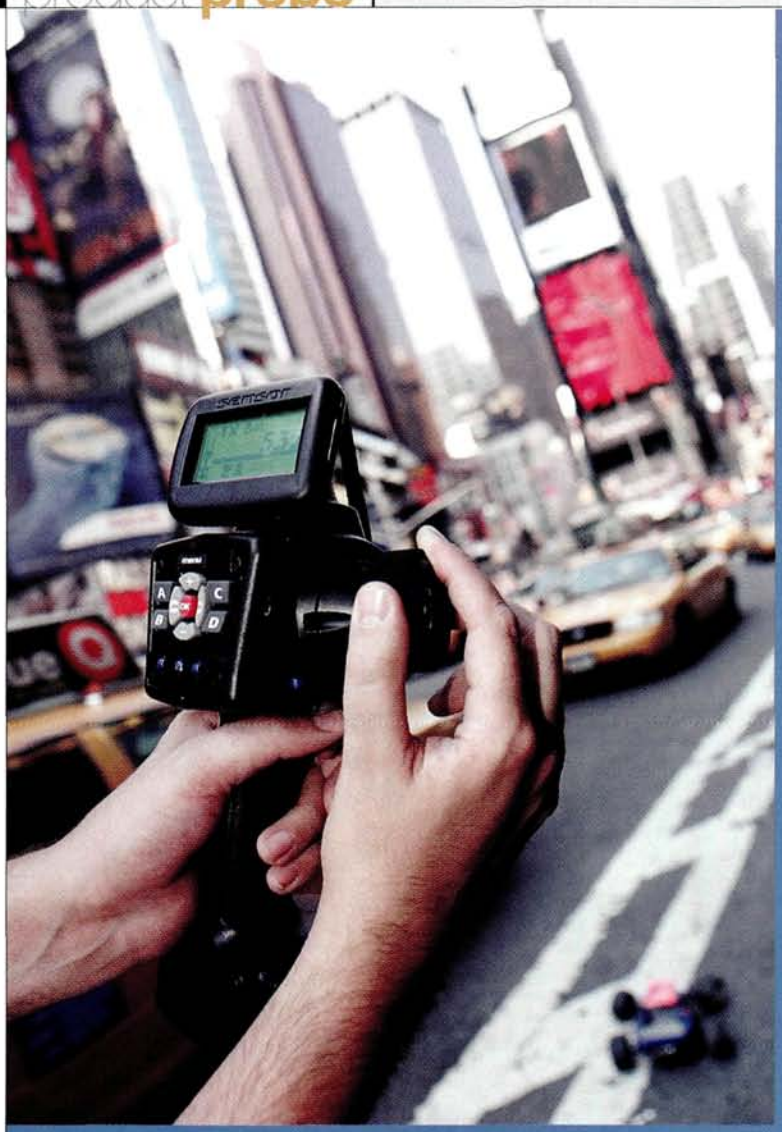
The Sensor's audio files can be changed. You can also create your own or use any WAV file you can find.

HITS

- Glitch-free performance.
- Highly adjustable.
- Upgradeable.
- PC connectivity.
- Real-time telemetry.
- Changing sounds is super-cool.

MISSES

- Transceiver is a bit large.
- Certain switches could be better.
- Fixed wheel & trigger tension.
- Less-than-perfect fit & finish.



Here we are—New York City. If this didn't test the limits of the Sensor, I don't know what would.

click trip FOR MORE PHOTOS
RCCARACTION.COM

TESTS AND THEN THE ULTIMATE TEST

As soon as I got the Sensor up and running, it was subjected to *RC Car Action*'s "radio trial by fire." Right in the hallway outside my office are a series of fluorescent lights. Under these lights, most radios glitch worse than "Stuttering John" Melendez. As I had hoped, the Sensor performed flawlessly and was impervious to any radio evil the lights emit; I even held it up to the bulbs without seeing as much as a single twitch. Next, I did a range test, and the Sensor operated perfectly at the claimed 1,000-foot range. During my initial tests, I found that some of the switches felt less than sturdy. They work fine but, in my opinion, could be better. Although I've never adjusted the wheel or trigger tension on any of my other radios, I wish the Sensor, which has a noticeably firm wheel and trigger, offered the option of adjusting this tension. After a battery pack or two, I got accustomed to the firm wheel return springs; the stiff throttle trigger suited my taste from the beginning.

For some real-world tests, I took it to Xtreme RC in New Milford, CT, for a day of racing. I messed with all of the usual settings that I use for racing—dual rate, exponential, trim settings, etc.—and each functioned without any problems. Since the Sensor is a digital system, it has certain very interesting features such as a dual rate range from 0 to 100. This won't be of too much use for my touring car or stadium truck, but it will be extremely useful on an oval car that I have never been able to dial enough steering out of with my old radio. During a day of racing, I didn't have a glitch or notice any delays in the servo's reaction time. I appreciated being able to practice when I wanted, and the Sensor is comfortable to hold. I find the audible cues helpful. Also as expected, the Sensor got a lot of attention, and everyone seemed to agree that though it looks a bit odd, it is comfortable to hold.

Though I raced in the electric stadium-truck class, I would, no doubt, have used the temperature sensor if I had run my nitro truck. I did hook the system up to a nitro touring car and dialed in the radio to vibrate if my engine's temperature exceeded 200 degrees. I intentionally chose a low setting that I knew the engine would readily reach and, right on cue, the radio vibrated to warn me that my engine had reached the temperature I had set.

The Sensor has all the features and adjustments that you'd expect in a high-end radio, but in my opinion, its top feature is that it resists interference. To put this feature to the ultimate test, we took the Nomadio Sensor to the busiest place on earth—Times Square, New York City. If the Sensor functioned without glitching in the center of that electronic maelstrom, odds are it will work fine at your track. I ran my Sensor-equipped T4, and it worked perfectly. I didn't have to wait for a 2.4GHz channel to be available, and I didn't notice any glitches or increased delays.

SO, WHAT IS DSS?

Want the inside scoop on what DSS is all about? I did, so I asked Nomadio engineer Dave Acker to shed some light on this new-to-RC technology. Here's what he had to say:

RC Car Action: In layman's terms, what is digital spread spectrum?

Dave Acker: A direct sequence spread spectrum (DSSS) radio sends each bit of data multiple times on different frequencies. Even if one or more of these "chips" are lost due to interference, the Sensor's transceiver can recover the original data. Each transmitter/transceiver pair agrees on a chip pattern. If an interfering transmitter sends on the same frequency using a different chip pattern, the receiver will see this as noise and ignore the signal.

RCCA: Are there any crystals in the Sensor or its transceiver?

DA: Nothing that requires changing, no. Inside each unit, there's one crystal that's used by the digital radio circuitry and one ceramic resonator used by the microprocessor. Pretty much any digital circuit will have a crystal oscillator somewhere. The individual channel frequencies are all synthesized.

RCCA: What else uses 2.4GHz, and is there any chance that those devices could interfere with the Sensor?

DA: Cell phones don't use the 2.4GHz ISM band. Here is a table of cell-phone frequency use:

GSM	850MHz, 1.9GHz (USA), 900MHz, 1800MHz (Europe/Asia)
CDMA	800MHz, 1.9GHz (USA)
TDMA	800MHz, 1.9GHz (USA)
iDEN	800MHz, 900MHz (USA)
AMPS	800MHz (USA)

WiFi networking products, Bluetooth devices and other devices using digital spread spectrum radio do operate in the 2.4GHz range. The Sensor uses a number of technologies to avoid interference with other 2.4GHz devices. The Sensor is smart enough to detect other devices operating in the 2.4GHz range in the same area and will move to other parts of the band. It also sends signals multiple times on multiple frequencies to make sure that they get through even if there is interference. Finally, unlike any other RC radio, it uses special codes in its messages so that other radio signals on the same frequency will never be mistaken for a command to your car.

RCCA: What about cordless phones?

Some cordless phones use the 2.4GHz band, but only when they're in use. Most are inherently short range; Bluetooth, for example, is typically good for less than 30 feet in most implementations. Technically, some HAM operators can license higher-power radios in this band, but that's actually true of quite a few bands. There's always something else in your neighborhood. For example, the 27MHz RC band (original Citizens Band radio, older ISM band gear), 49MHz (pre-FRS "personal communicators," baby monitors, older analog cordless phones), 72MHz and 75MHz (within the 72MHz-76MHz Land Mobile Service band, which can include assistive listening devices, pagers, wireless microphones, aircraft beacons and some other government radios. The big advantage of 2.4GHz systems is that, being smart, they can automatically get out of the way of a noisy channel.

Due to the redundancy in the Sensor signal, it's more likely that the Sensor would affect another 2.4GHz radio than be affected itself. Each bit sent is split into a number of parallel channels on different frequencies and mixed by a pseudo-random number so that the signal tends to appear as background noise in the environment. When the signals are reconstructed, the same pseudo-random number tends to cancel out most low-level sources of outside noise. The Sensor has multiple levels of error-checking to ensure that it's only permitted through if it is an uncorrupted message.

RCCA: How many people can use Sensors in the same area at the same time?

DA: There are only 80 channels available so, in theory, the total number of 2.4GHz units (no matter who made them) that can be in use is 80. In practice, it's less than that because every manufacturer's radio allocates 2 to 3 channels for "bind channels." They are used by the radios to find each other when they are first turned on. Sensor uses different bind channels than other radios do, so let's assume that takes 6 channels away. That still leaves over 70 channels ready to be used—a great improvement on a crystal radio. Another advantage versus crystal radios is that if you turn on a DSS radio and it can't find a free channel, it will just wait; nobody who is running will be affected.

The Nomadio crew talk shop.

RCCA: Does DSS offer a faster or a slower response than traditional radio technology?

DA: Digital Spread Spectrum combined with Nomadio's software delivers much faster response times than traditional radio technology. Our design team optimized the software and hardware for incredible speed and accuracy. The system sends control and telemetry updates to and from the car 100 times per second with a resolution of 4,096 steps per channel.

RCCA: Why does the Sensor not need the 12 volts (8 AAs) that most radios require?

DA: Our design uses components that require little power, so even with an embedded CPU, we keep power requirements quite low. Our control systems are based on modern CMOS technology—an ultra-low-power 16-bit RISC microprocessor, etc. This is well matched to the 3.3V to 3.5V radio subsystem, so it's wasting a minimum of power in voltage conversion. A typical CPU-enhanced analog radio running from 12 volts or so wastes quite a bit of power in the process of converting down to the 5-plus volts or so that is used for a typical microprocessor subsystem (LCD screen, etc).

RCCA: As far as new features for the Sensor go, what can we expect from Nomadio?

DA: Nomadio has a three-year product roadmap that will involve a number of staged enhancements to the hobby, all enabled by the presence of a programmable microprocessor inside the car and a high-speed digital link to the controller; we call this "Brains and bandwidth." Taking our cues from full-size auto-racing's very successful use of telemetry, we will offer a much wider selection of sensors that can be implanted in cars to improve performance—a spring-travel sensor for tuning suspension and tires and an exhaust-gas temperature sensor for motor tuning. We'll also add sensors for other types of vehicles such as a wind sensor for sailboats and a water-speed sensor for boating. There will be new software applications to capture and analyze the telemetry in real time. By early 2006, we will be offering a programmer's tool kit that will allow third-party software vendors to develop products that leverage Nomadio's hardware to develop entirely new products. We think it's important to note that as the first software-based RC controller, the Sensor product continues to grow in capability after you buy it. It's much more like a PC peripheral than a typical crystal RC radio because you can do so many things with it to improve it after you buy it. Contrast that with a typical RC radio that is locked in with whatever functionality the manufacturer put in at the factory.

THE VERDICT

The Nomadio Sensor is legit. It might not look like every other radio out there, but once you get over that, you soon realize how good it is. I would like to see some of the switches improved, but other than that, I can't find anything wrong with this system. Also, the Sensor I tested is a first-run unit, and I don't doubt that future runs will be improved. This is the radio I'll use for racing from now on; I just have to get my hands on about four more transceivers! ■

FIND IT
>>> Go to page 219 for manufacturers' contact information.

RACER NEWS

BY JASON SAMS

HOT ROD HOBBIES SHOOTOUT

Jimmy Babcock's popular Shootout was the scene of yet another victory for RC's new vanguard of off-road talent. Team Trinity/Associated's Ryan Cavalieri won both Gas Truck and Modified Truck with his Factory Team GT and T4 trucks, while Ryan Maifield won Modified 2WD with his Reedy-powered B4. In four-wheel, Team Trinity/Losi's Mike Truhe wheeled a Triple-X4 to take the win, spoiling an Associated sweep.

Factory Modified 2WD	
1 Ryan Maifield	Associated B4
2 Jared Tebo	Associated B4
3 Billy Easton	Team Losi BK2
4 Mike Truhe	Team Losi BK2
5 Travis Amezcua	Team Losi BK2

Factory Modified 4WD	
1 Mike Truhe	Team Losi Triple-X4
2 Ryan Cavalieri	J-Concepts BJ4
3 Dave Montgomery	J-Concepts BJ4
4 Greg Hodapp	X-5
5 Billy Fischer	Team Losi Triple-X4

Factory Modified Truck	
1 Ryan Cavalieri	Associated Factory Team T4
2 Jared Tebo	Associated Factory Team T4
3 Dave Montgomery	Associated Factory Team T4
4 Ryan Maifield	Associated Factory Team T4
5 Travis Amezcua	Team Losi MF2

Factory Gas Truck	
1 Ryan Cavalieri	Associated Factory Team GT
2 Jared Tebo	Associated Factory Team GT
3 Marty Korn	Associated Factory Team GT
4 Philip Atondo	Team Losi AD2
5 Joe Pillars	Associated Factory Team GT

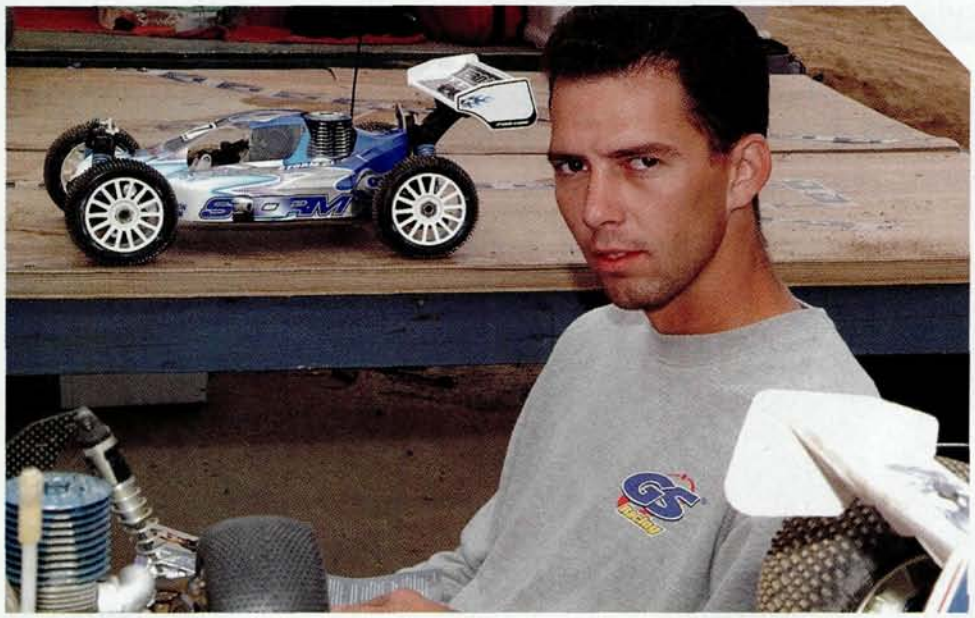
BRIT BATTLE

Oxfordshire, England: Neil Cragg won 2WD Modified with his Team Associated B4 and took the four-wheel win with a Yokomo MR4-BC at the BRCA (British Radio Car Association) National Series. Other very fast pros such as Team Losi's Travis Amezcua, Richard Taylor and Jukka Steenari also competed in the race to get ready for the Worlds.

2WD	
1 Neil Cragg	Associated B4
2 Richard Taylor	Team Losi BK2
3 Jukka Steenari	Team Losi BK2

4WD	
1 Neil Cragg	Yokomo MR4-BC
2 Richard Taylor	Team Losi XX4
3 Stuart Mahon	Team Losi XX4

RACER NEWS

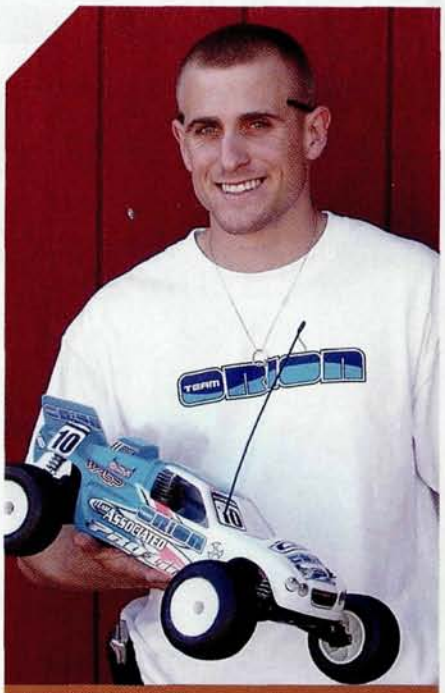


MARTY KORN NOW ORION ENGINE-POWERED

GS Racing/Team Associated Factory driver Marty Korn will power his nitro vehicles with Team Orion's line of Wasp engines. In his first race with the Wasp .12 at the Hot Rod Hobbies Shootout, Korn finished third overall. Marty says, "Until now I have always run rear-exhaust engines in my gas trucks, but Team Orion's side-exhaust engines are the smoothest .12s I have ever run. I hear the new .21s should be dialed for buggies, so I'm happy, for sure."

KO PROPO GRAND PRIX

Tamiya America's plush facility in Aliso Viejo, CA, played host to this year's KO Propo Grand Prix. In the Open Modified class, Team Losi's Josh Newman took TQ honors after four super-consistent rounds of qualifying. In the triple A-main, Tamiya driver David Jun capitalized on a Newman mistake in the A1 to win the first leg. Newman came back to win the second Main, setting the stage for an all-or-nothing showdown. Team Associated's Barry Baker, Corally's Chris Tosolini, Jun and Newman formed a four-car freight train for the final race. Baker won the third and final Main, and Jun grabbed second to secure the overall victory. Newman finished second overall, and third overall went to Tosolini.



AFTER FIGHTING IN THE DESERT, THIS SERGEANT JUST WANTS TO HIT THE DIRT

When Sgt. Sheldon Ko got back from Iraq, he couldn't wait to hit the ARC track in Marietta, CA, with his brother Brandon; too bad his gear was nowhere near RTR after a full tour of Saddam's old stomping ground. No worries: Sheldon found no shortage of folks glad to help Brandon and him out. Team Orion's Gary Guest kicked down his personal Factory Team GT with a new Team Orion engine and fuel, and Pro-Line came through and hooked Sheldon up with tires. The Sarge went on to TQ and won the 30-minute A-main.

PRO POLL

Who would be the ultimate trophy girl?

Marty Korn >>>
GS Racing/Team Associated
Tara Reid

Mike Truhe >>>
Team Trinity/Losi
Jessica Simpson

Jeremy Kortz >>>
Kyosho/Werks Racing
J-Lo

Jimmy Babcock >>>
Team Trinity/Losi
Sarah Michelle Gellar

GOT A STORY FOR RACER NEWS?
Contact Jason Sams at jasons@airage.com.

BY JASON SAMS

UNDER THE HOOD

Mike Truhe's Team Losi Triple-X4

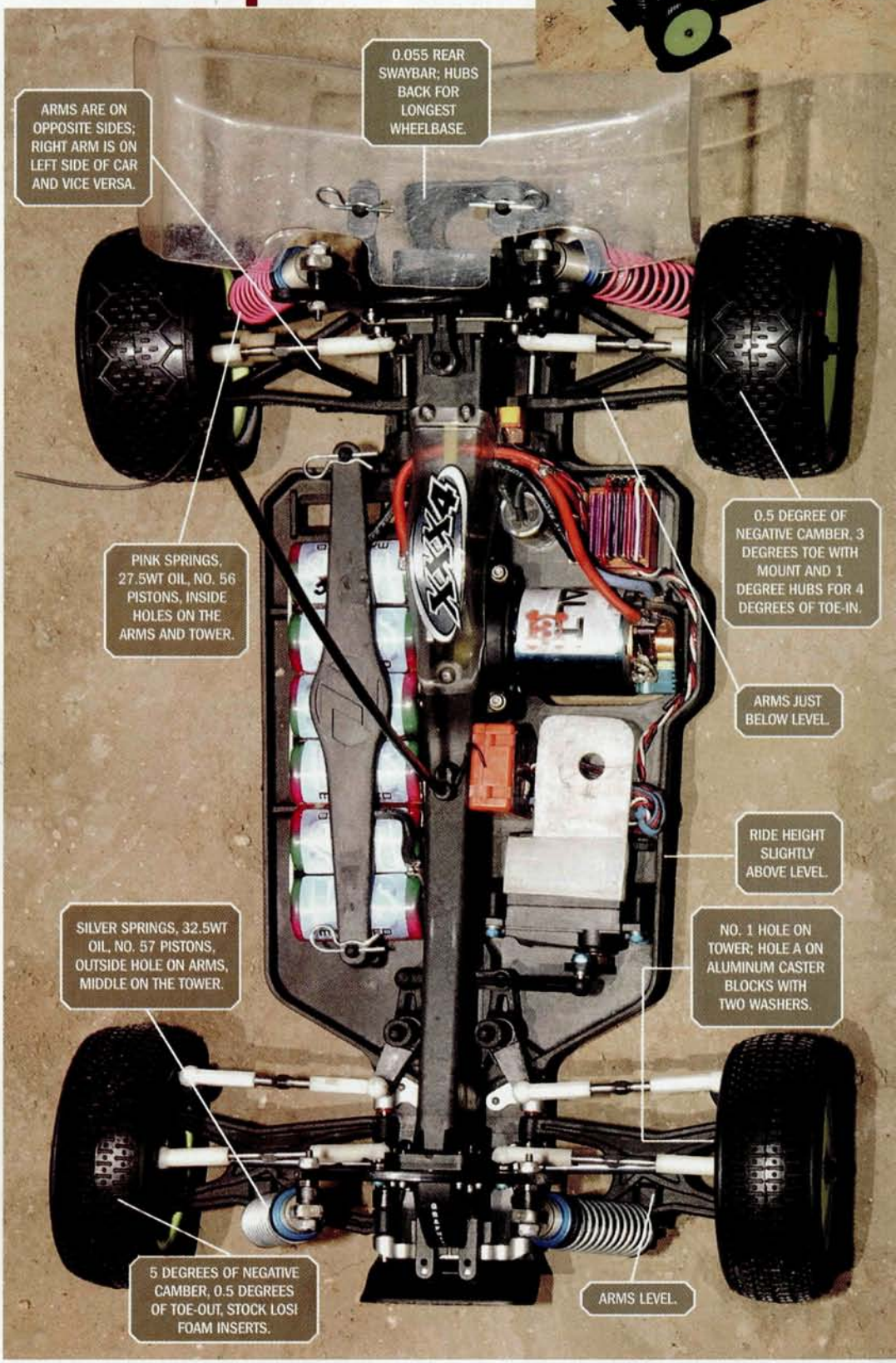
RACE GEAR
Radio Airtronics M11
Servos Airtronics 94360
Motor Trinity Cobalt 9x1
Cells Trinity GP3300 Evo 3
ESC Novak GTX
Receiver Novak XXtra
Tires (F/R) Team Losi taper-pins/BK bars
Wheels Team Losi
Inserts Trinity 2-stage (rear only)
Gearing 18/92

FACTORY
- Lunsford Racing titanium screws
- Team Losi aluminum pivot blocks
- Lunsford titanium ball studs
- A-Main Racing Products aluminum caster blocks

Mike runs the battery wires through the gear cover, and mounts the speedo's switch on the side of the belt tunnel.

Truhe runs Team Losi's Triple XS rear pivot blocks because the pivot points are about 0.180-inch wider. The blocks are used with CR hubs to meet ROAR maximum legal width. "It jumps better, and it's more stable in the rear. It's something a couple of us have been playing with," says Mike.

Titanium screws and ball studs are used throughout Truhe's ride. He also runs two Trinity preload collars on each shock, which is a pretty standard treatment on all factory rides.



Interview

DRIVER: MIKE TRUHE
AGE: 22
YEARS RACING: 5
LAST BIG WIN: '05 ROAR OFF-ROAD MOD NATS
SPONSORS: TEAM LOSI, TRINITY, NOVAK, AIRTRONICS, LUNSFORD, DARKSIDE DESIGNS, VINYL GRAPHICS AND PACIFIC-COAST-HOBBIES.COM
WATCH: AMERICAN CHOPPER, AMERICAN HOT ROD—THOSE TYPES OF SHOWS ARE ALL I REALLY WATCH.
LISTEN: PRETTY MUCH EVERYTHING, BUT NO COUNTRY.
WHEN I'M NOT RACING I: HANG OUT AND PLAY POOL.

Q: Is 4WD your favorite class? You always do well when you race it.
A: Yup, I just put a lot of time into 4WD and take pride putting that much effort into racing the class. It's just so much fun to go that fast on an off-road track. Strapping in that much horsepower and using it is cool.

Q: In monster truck and 1/8 scale, 4WD seems to be on the rise. Why do you think that isn't the case in electric racing?
A: I think it's getting better now with more manufacturers making cars. I think what was hurting the class was that Team Losi was the only one making a car for quite some time.

Q: Brushless motors, larger-capacity batteries and more efficient electronics could really change electric racing; what would you like to see happen?
A: I wouldn't mind seeing longer qualifying and longer Mains. I don't see why the length couldn't be changed like it did when it went from four minutes to five minutes. It certainly can be done.

Q: Kinwald is your boy, and he has probably taught you a ton of stuff. What are the most important things you have learned from him?
A: The biggest thing he has taught me is all about setup and how things work. He has taught me the theories and concepts on how and why things function the way they do. What each thing does on our cars. He basically molded me into what I am, what I know and how I do things.

Q: When this issue hits the newsstand, it will be just after the Worlds in Italy; who do you predict will win 2WD and 4WD?
A: In 2WD, Cavalieri is obviously going to be fast. Neil Cragg will be good, too; it's his home track. You can't count out myself, Kinwald, Francis, Amezcua, and Robbers. In 4WD, all the same guys, but you also have to include Hara and Jukka Steenari.

Q: Fortunately, nobody gets hurt racing RC, but if someone wasn't able to compete in Italy, who would you want out simply because they are just that good?
A: Cavalieri—because he is the most dominant driver out there right now! I think it would be a pretty much a unanimous decision among pro drivers.

Q: Who is the most underrated electric RC racer?
A: Probably Jimmy Babcock. He has proven himself in the past, and he still holds his own. He made both A-mains at the '03 Worlds. If he raced more, he would definitely be a much bigger threat.

Q: There are about 400 entries at large races, and the entry fees are usually about 50 bucks. If entry fees were 100 bucks and racers in each A-main were paid $2,000 for first, $1,000 for second place and so on, would people be willing to fork out the extra cash for the entry fee, and what would it do for racing?
A: I think the big thing is to get money from outside sponsors. The extra cash shouldn't come from the racers. The outside sponsors could have their own shootouts. The money would definitely spice it up and be a good incentive for racers.

Q: Describe the perfect race.
A: Having a race at an already big event like an amusement park or in a big hotel casino would be genius. If you hold it where it gets exposure in front of people who don't know what it is or that RC racing existed. ■

FIND IT
>>> Go to page 219 for manufacturers' contact information

Reedy Touring Car Race

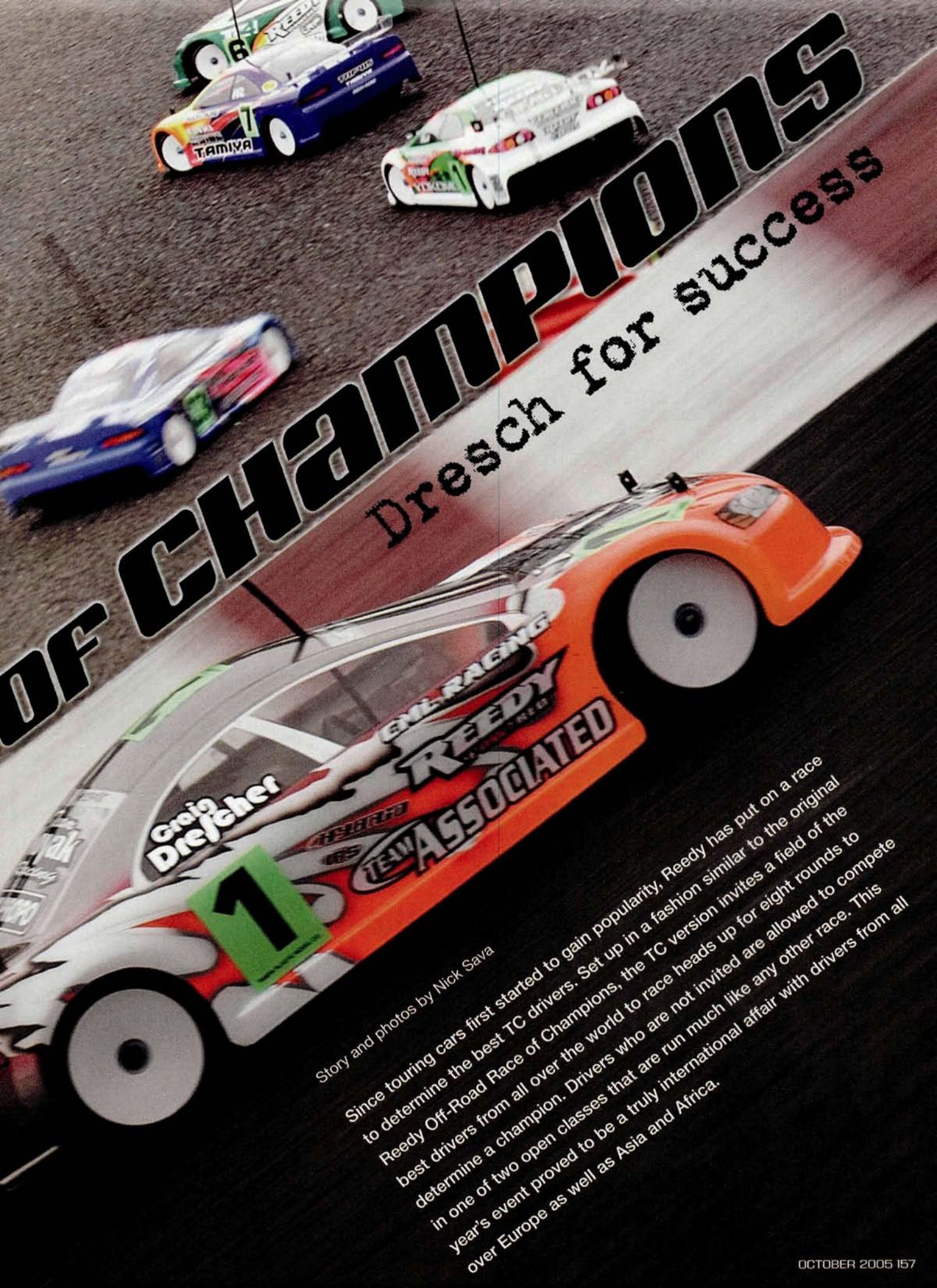
RACE SPECS

Location: Tamiya USA test track, Aliso Viejo, CA
Primary sponsors: Reedy Modified Motors, Associated Electric, Team Losi, Team Orion, Pro-Line Racing, Schumacher USA, Much More Racing, HPI Racing, Airtronics, Yokomo USA, Novak Electronics, KO Propo, Speedtech RC
Classes: Invitational, Open Spec, Mod
Qualifying: IFMAR style, 4 rounds
Mains: triple-A in Open Spec and Mod
Invite: 34 drivers, 8 rounds of 4 races each, reshuffled every round. Best 6 out of 8 rounds count.
Handout spec motor: Reedy Quad-Magnet 19T
Handout tire: Take-Off RP-30 Premount

Not only did Craig Drescher win in his first outing with he new Factory Team TC4, but he also won with a stick radio!

Of Champions

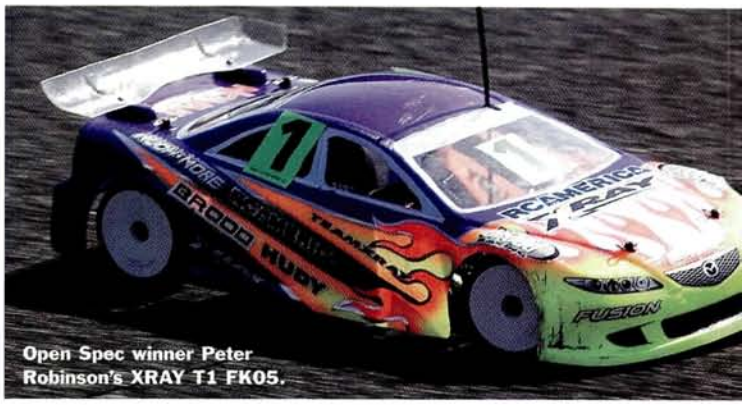
Dresch for success



Story and photos by Nick Sava

Since touring cars first started to gain popularity, Reedy has put on a race to determine the best TC drivers. Set up in a fashion similar to the original Reedy Off-Road Race of Champions, the TC version invites a field of the best drivers from all over the world to race heads up for eight rounds to determine a champion. Drivers who are not invited are allowed to compete in one of two open classes that are run much like any other race. This year's event proved to be a truly international affair with drivers from all over Europe as well as Asia and Africa.

RC Nitro model Courtney Day presented the prizes. Yes, she is a honey!



Open Spec winner Peter Robinson's XRAY T1 FK05.

Left: **Novak drivers swept all three classes (left to right: Craig Drescher, Peter Robinson and Josh Numan).** Above: **Atsushi Hara (left) pits with his Hot Bodies teammate. Check out all the chargers and discharge boards.**

OPEN SPEC

Top qualifier & winner: Peter Robinson
Car: XRAY T1 FK05

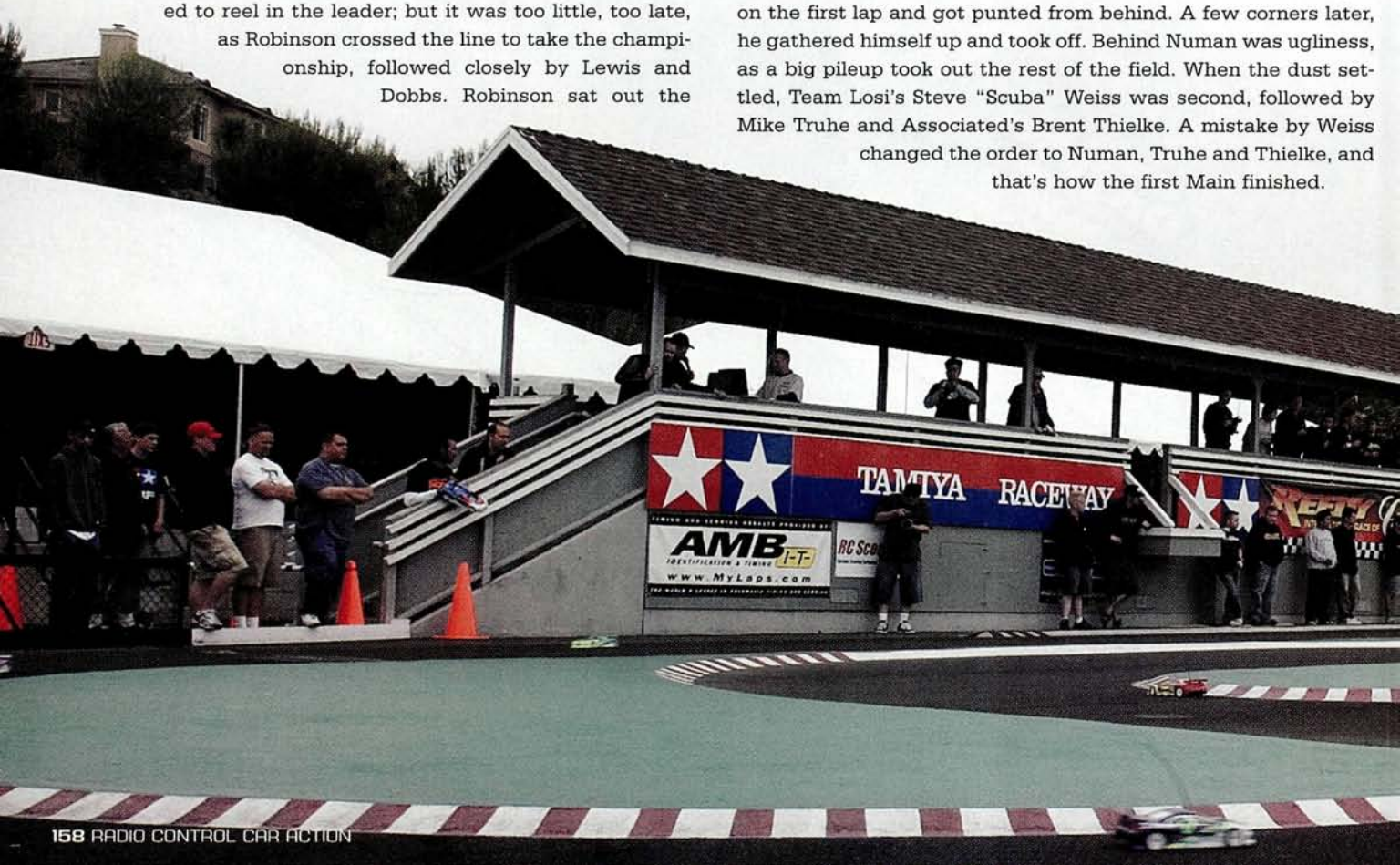
Peter Robinson showed that his TQ wasn't a fluke by taking off from the field in the first Main and cruising to an easy victory. Behind him, however, was quite a battle as Mike Dobbs tried hard to hold off oval racer Jason Ertrachter. Dobbs eventually rolled his Corally RDX, allowing Ertrachter to take second, also wheeling an RDX. In the second Main, carnage in turn one allowed Robinson to get an early lead that left Dobbs, Ertrachter and the rest of the field battling for second.

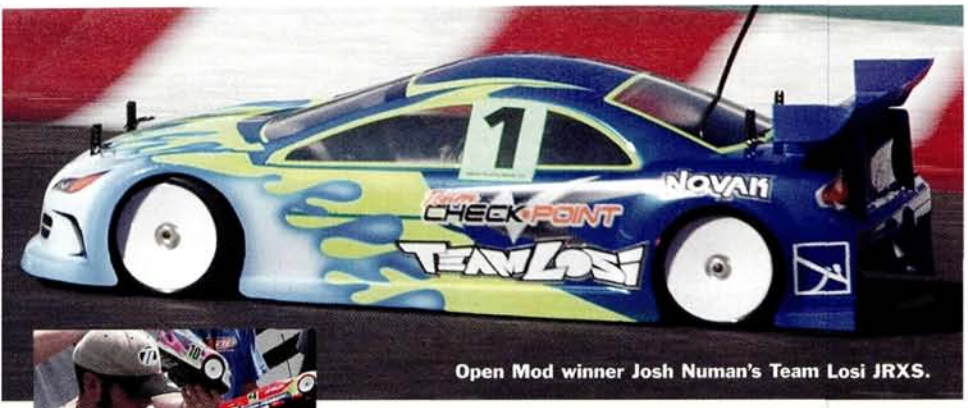
Corey Lewis, another SoCal native, managed to move his Tamiya TRF 415 MS from dead last into the second spot and started to reel in the leader; but it was too little, too late, as Robinson crossed the line to take the championship, followed closely by Lewis and Dobbs. Robinson sat out the final Main, in which Ertrachter took the win from the fourth qualifying spot, followed by Corally's Edgar Fiallos and XRAY's Alexander Lopez.

OPEN MOD

Top qualifier & winner: Josh Numan
Car: Team Losi JRXS

The Mod Mains were all about Josh Numan. In the first corner, Numan showed his nerve as he clipped the curb of the sweeper on the first lap and got punted from behind. A few corners later, he gathered himself up and took off. Behind Numan was ugliness, as a big pileup took out the rest of the field. When the dust settled, Team Losi's Steve "Scuba" Weiss was second, followed by Mike Truhe and Associated's Brent Thielke. A mistake by Weiss changed the order to Numan, Truhe and Thielke, and that's how the first Main finished.





Open Mod winner Josh Numan's Team Losi JRXS.

Here's something you don't see too often: Brian Kinwald sets someone else's car down on the track.

Left: Masami Hirosaka made a rare appearance at the Reedy TC Race. Masami finished fifth overall in the Invitational. Right: Open Mod TQ and winner Josh Numan gets harassed by one of his fans. (Actually, that's his girlfriend, if you haven't guessed.)

NEW HANDOUT TIRES

Most big races lately have been using handout tires, and the Reedy Race is no exception. This year, however, a new handout tire was introduced—the Take-Off RP-30. Drivers generally stated that the new tire has more grip and consistency than the previous CS-27s. Tire allotments were limited to four sets per driver in the Invitational and Open classes. Drivers who made it to the triple A-mains were not allowed to purchase additional sets as in the past. This led to many tough decisions on when to run new tires and when to use one-runs.

During the Invitational, I asked some of the drivers for their opinions on the handout tires. Here's what they said.

Atsushi Hara: I like them. It's easy; everyone's are the same. I just wish I had eight sets—one for each round of invite.

Matt Francis: I love handout tires. Handout tires are the bomb. It's easy for the racers because we don't have to know all of the secrets to inserts and compound selection, but it's hard for the manufacturers, since they don't get to showcase their products.

Paul Lemieux: I think they're good. Before I was sponsored, I'd go to a race and spend my life savings buying five sets of tires and inserts, and when I found the set that worked best, I'd only have enough for one more set. This way, we know what we need to run, so it's easier and cheaper. [Now that I don't have to pay for it anymore], I don't see anything wrong with running any tire again.

Brian Kinwald: It depends. If we knew how to choose the best tires and inserts, I wouldn't have a problem with running our own tires. It is bad for the manufacturers, since they spend lots of money developing tires that can't be raced at big races. New stuff is what keeps people racing, and if companies can't race their new products, they'll stop making them. Half of the races should be run with handouts, and half should be run with what you bring.

KEEPING IT COOL

The post-tech area where cars go after the race was quite noisy after the first round. In an attempt to combat the heat generated from running low-wind motors for 5 minutes, most drivers run fans on their controllers and motors. Some drivers have two switches—one for the speed controller and one for the fan, which stays on after the race.

In the second Main, a great start by second qualifier Jared Scott moved his XRAY into the lead. Everyone from third on back was involved in a huge pileup that let the two leaders open a huge gap on the field. Out front, Scott had difficulties and handed Numan a large lead over the rest of the field. Thielke moved into second followed by Associated's Ben Bustamante. Numan slowed at the end to save his car but still held on for his second Open Mod win in three years. Scott finished fourth.

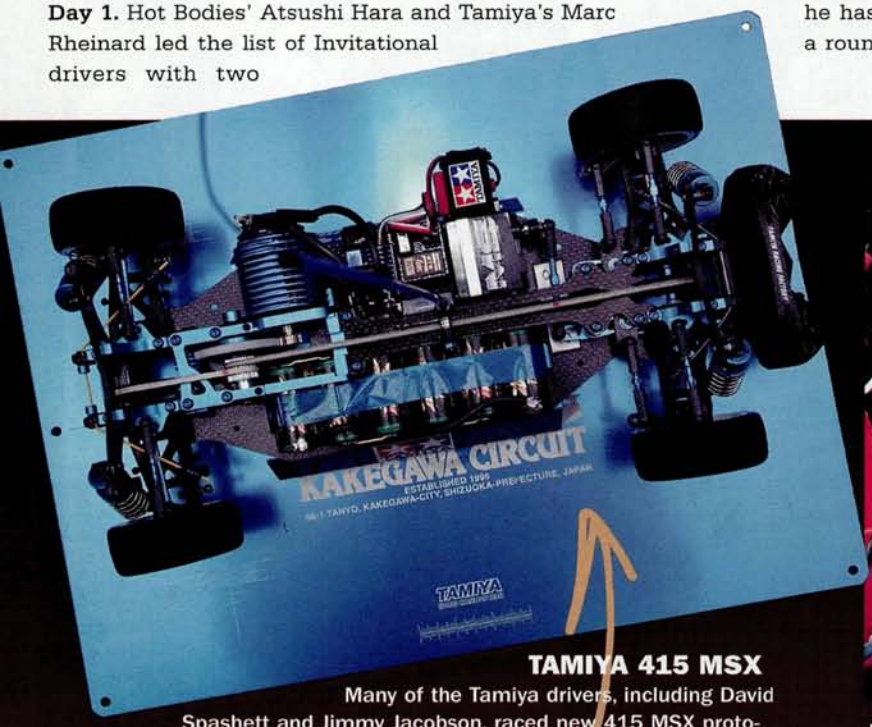
With Numan out of the final Main, Scott took the lead and never looked back; he ran the fastest lap of the race by more than 1/10 second and had the only 23-lap run in the Mains. Off-road specialist Truhe took second, and Hodge battled from the back to take third. When all was said and done, Numan took the overall title, followed by Truhe and Thielke.

INVITATIONAL

Winner: Craig Drescher

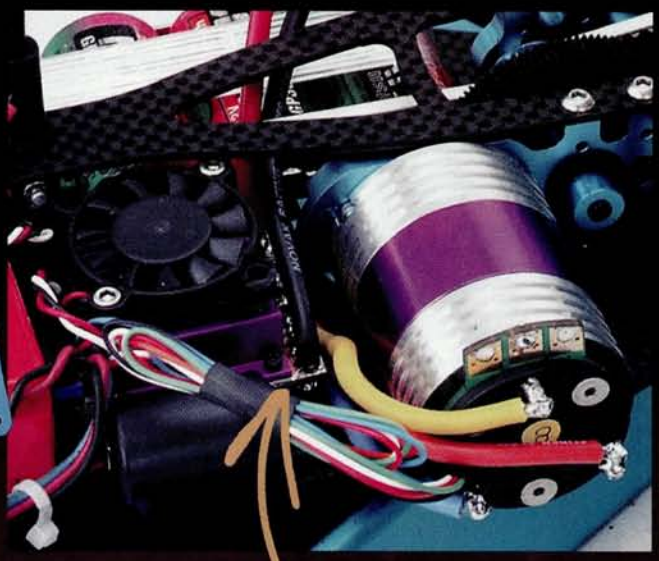
Car: Team Associated Factory Team TC4

Day 1. Hot Bodies' Atsushi Hara and Tamiya's Marc Rheinard led the list of Invitational drivers with two victories each. XRAY's Jilles Groskamp was third with one win and a pair of seconds, and Ralph Burch and Craig Drescher rounded out the top five. In round two, Brian Kinwald did what he hasn't done since the Reedy Race moved to Tamiya: he won a round of the Invitational.



TAMIYA 415 MSX

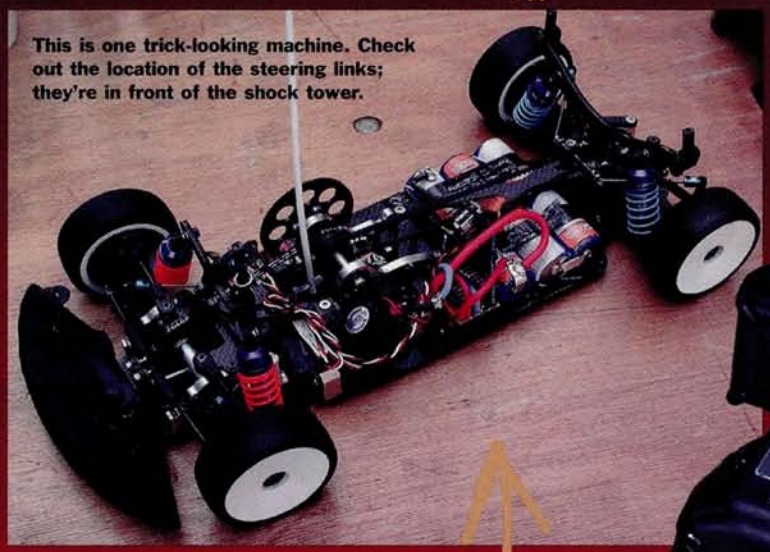
Many of the Tamiya drivers, including David Spashett and Jimmy Jacobson, raced new 415 MSX prototypes. The 415 MSX has longer suspension arms and new shock towers that change the suspension geometry. The car also has a 2.5mm-thick chassis instead of 3mm like the previous version. The drivers reported that the car feels more planted as a result of added traction. These small tweaks make a big difference over the previous design.



NOVAK BLS BRUSHLESS CONTROLLER AND MOTOR

A few guys in Open Modified ran Novak's new BLS brushless motor system. Designed for performance, the BLS very capably ran against brushed motors, as Novak's Scuba Weiss put one in the Main. The motor will initially be available with 5.5- and 6.5-turn motors; a 4.5 is possible in the future. Talk about power! The controller comes with an installed fan and a new switch used to program the unit.

New in the pits



This is one trick-looking machine. Check out the location of the steering links; they're in front of the shock tower.

KYOSHO'S NEW RIDE

Paul Lemieux and Josh Cyrul competed in the Invitational with a prototype Kyosho car. According to Cyrul, the mid-motor, rear-battery car incorporates a lot of ideas he has wanted to try. Neither driver had much time with the car, as the parts to build it arrived on Monday before the race, but both looked pretty good at the end of the weekend. Don't expect to see it in stores anytime soon; Cyrul said that the final design won't be ready for at least a year.

AIRTRONICS M11

Airtronics showed off its M8 replacement—the M11. The new radio's many important features include much faster response time, vastly improved screen and programming features as well as traction control, 2- or 4-channel operation with mixing and 30-model memory. Older modules are compatible with the new radio with a slight modification but don't benefit from the new radio's high-speed operation.

Novak and Horizon are planning appropriate changes to their current modules that should be available soon after the M11 hits the shelves. According to Airtronics, it should be available by the time you read this; expect a price increase of about 30 bucks over the current M8.

A referee next to the announcer made rough driving calls that sent drivers to the penalty box at the rear of the track near the hairpin for a stop and go. In round four (the last of the day), the driving got ugly, and the green penalty box was occupied frequently.

Day 2. In the first round, the top five got closer with wins by Rheinard, Drescher and Spashett. Hara and Groskamp took second in their races. In round six, driving got really rough, and Hara was tagged with a penalty for an accident on the front straight. The audience booed to express their disagreement with the call.

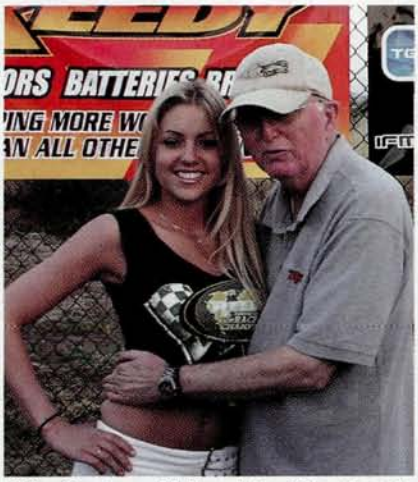
Race three saw Hara and Rheinard going head to head. A bad start had Hara last, but he had moved up to third by the end. Spashett took the win with his Tamiya TRF, followed by Drescher. This set up the final race, in which second-place Groskamp had difficulties and finished fourth, giving him the same total points as Drescher and a tie for the win. The tie-breaker came down to who had the fastest single run, and that honor—and the title—went to England's Craig Drescher, weho delivered Associated its first win with the Factory Team TC4 in its race debut.

REEDY RACING CLASSES

Mike Reedy might be retired, but his races live on. Thirty-four of the world's best touring car drivers competed in the Invitational, along with the winner of last year's Open class, Ryan Cavalieri. Split into heats of eight or nine, drivers race heads up for eight rounds without any qualifiers. After each round, they are shuffled so they'll race against all the other drivers.

Points are based on final standings, and the top six finishes are used to decide the winners. In the event of a tie, the tie-breaker is the driver with the greatest number of top finishes, or if that is not enough, a driver's single fastest run.

Both of the Open classes featured triple A-mains to decide the winners, but drivers were unable to purchase extra tires for the Mains, which meant that the four allotted sets had to be used for all four rounds of qualifying and the triple A-mains.



Mike Reedy couldn't resist getting close to Courtney.

WRAP-UP

The Reedy Touring Car Race is doing better than ever, as shown by the awesome on-track competition as well as the sheer number of people trying to get in. Congratulations to Peter Robinson, Josh Numan and Craig Drescher on winning their classes, and a big thanks to Tamiya USA for putting on a very professional race. Next year's race is sure to sell out, so don't miss the deadline for the entry lottery. See you next year! ■

INVITATIONAL

FINAL	DRIVER	CHASSIS	MOTOR	BATTERY	ESC	RADIO	BODY
1.	Craig Drescher	Associated FT TC4	Reedy TI 7x1	Reedy	Novak GTX	KO Propo	Protoform Stratus 3.0
2.	Jilles Groskamp	XRAY T1 FK05	Peak V2	Peak	INS	KO Propo	Protoform Mazda 6
3.	Atsushi Hara	Hot Bodies Cyclone	Orion 7x1	Orion	Hara 2	KO Propo	Ride Accord
4.	Marc Rheinard	Tamiya TRF 415 MS	Orion V2	Orion	INS	KO Propo	Protoform Mazda 6
5.	Masami Hirosaka	Yokomo BD	Reedy 7x1	Yokomo	Yokomo VFS	KO Propo	Protoform Matsuda 6
6.	David Jun	Tamiya TRF 415 MS	Reedy	Reedy	LRP	Futaba	Protoform Stratus 3.0
7.	David Spashett	Tamiya TRF 415 EVO	Peak 7x1	Peak	LRP	KO Propo	Protoform Mazda 6
8.	Ralph Burch	XRAY FK05	Epic Cobalt	Epic	Novak	KO Propo	Protoform Stratus 3.0
9.	Satoshi Maezumi	Tamiya TRF 415 MSX	Transpeed	Cosmo Energy	INS	KO Propo	Ride
10.	Andrew Moore	Hot Bodies Cyclone	Orion	Orion	INS	KO Propo	Ride Honda

SPEC 19T

1.	Peter Robinson	XRAY T1 FK05	Handout	Fusion	Novak GTX	KO Propo	Protoform Mazda 6
2.	Jason Ertrachter	Corally RDX	Handout	KMR	INS	Airtronics	Protoform Mazda 6
3.	Mike Dobbs	Corally RDX	Handout	Express	INS	Airtronics	Protoform Mazda 6
4.	Alexander Lopez	XRAY T1 FK05	Handout	Trinity	KO VFS-1	KO Propo	Protoform Mazda 6
5.	Charlie Albrecht	Corally RDX	Handout	Pole Position	Novak GTX	Airtronics	Protoform Mazda 6
6.	Corey Lewis	Tamiya TRF 415 MS	Handout	Novak	Novak GTX	Airtronics	Protoform Mazda 6
7.	E.J. Evans	Tamiya TRF 415 MS	Handout	Pole Position	Novak GTX	Airtronics	Protoform Mazda 6
8.	Edgar Fiallos	Corally RDX	Handout	INS	INS	Airtronics	Protoform Mazda 6
9.	Furman Walker	Corally RDX	Handout	Fusion	KO VFS-1	KO Propo	Protoform Mazda 6
10.	Aaron Young	Corally RDX	Handout	K-C Racing	INS	Airtronics	Protoform Mazda 6

OPEN MOD

1.	Josh Numan	Team Losi JRX-S	Checkpoint	Fusion	Novak GTX	Airtronics	Protoform Stratus 3.0
2.	Mike Truhe	Team Losi JRX-S	Trinity	Trinity	Novak GTX	Airtronics	Protoform Mazda 6
3.	Brent Thielke	Associated TC4	Reedy	Reedy	LRP QC2	Airtronics	Protoform Mazda 6
4.	Jared Scott	XRAY T1 FK05	Novak Velociti	SMC	Novak GTB	KO Propo	Protoform Mazda 6
5.	Todd Hodge	Team Losi JRX-S	Trinity	Trinity	LRP QC2	Airtronics	Protoform Mazda 6
6.	Ben Bustamante	Associated TC4	Reedy	Reedy	LRP QC2	Airtronics	Protoform Mazda 6
7.	Rod Canare	Tamiya TRF 415 MS	Orion	Pro-Match	LRP QC2	Futaba	Protoform Mazda 6
8.	Bobby Flack	XRAY T1 FK05	Epic	Epic	Novak GTX	KO Propo	Protoform Stratus 3.0
9.	Toshihiko Hara	Hot Bodies Cyclone	INS	INS	Hara Twister 2	Airtronics	Ride
10.	Steve Weiss	Team Losi JRX-S	Novak Velociti	Novak	Novak GTB	Airtronics	Protoform Stratus 3.0

INS = information not supplied by driver

PRACTICE MAKES PERFECT

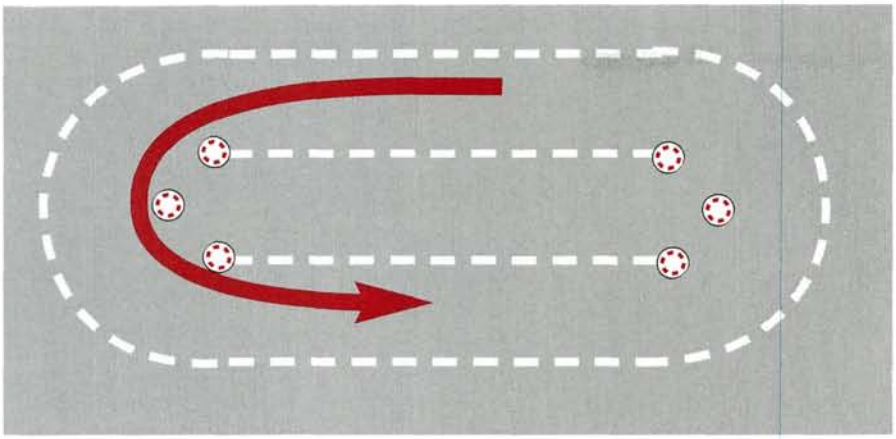
THE SAYING "PRACTICE MAKES PERFECT" applies to just about everything in life, and in the world of RC racing, nothing could be more true. When I started driving RC cars, I just couldn't get enough of wheel time. As a kid, I'd run it anytime, anywhere. I always had some sort of makeshift course to run around. Whenever I'm asked how to become a better driver, I always recommend racing a minimum of every other weekend. If this isn't possible, then make sure that when you drive your car for fun, you create a course to run around. Better yet, try the exercises covered here. They'll make you faster and more confident on any track.

You wouldn't be this close to your car on an actual track. As you get a feel for the car, move back to "race distance." It's also a good idea to vary your position relative to the course, since you'll need to be able to drive from any angle when it's race time.

PHOTOS BY JOHN HOWELL & PETE HALL

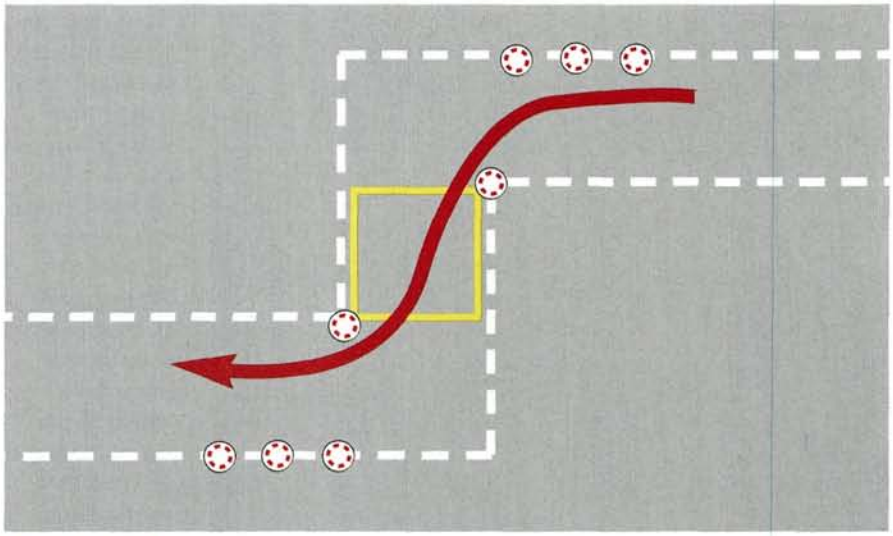
SLALOM COURSE

Set up a slalom course with cones or markers about 4 feet apart to start. Run through the cones in both ways, and increase the distance 1 foot at a time until you reach about a 10-foot spacing. This simple exercise will teach you throttle control and entry speed. The even spacing will allow you to get a rhythm through the course, and increasing the spacing will allow you to increase your speed, which will make things much more difficult. I also recommend that you regularly change where you stand to drive in relation to the course. A different perspective changes everything and will simulate the different viewing angles that you will experience at the track. Of course, if you can get someone to time you, this will ultimately let you know when you are getting it right.



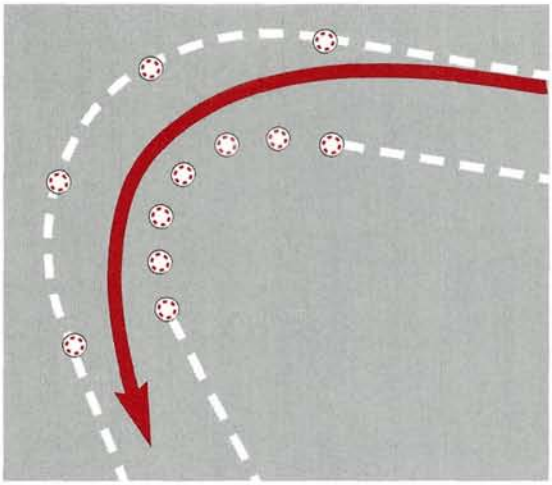
THE OVAL

Set up markers approximately 70 to 80 feet apart. You can use just two markers, but three or four at each end works the best to round the corners. The drill is to run around this course clockwise and then counterclockwise looking somewhat ahead of the car to find the corner and get as close to the markers as you can. First stand near the center of the front straight where a normal drivers' stand would be and run your laps in both directions. Once you get a feel for this, stand at one of the two corners so you are looking directly down the center of the track, and run a few more laps. This position will help you to recognize any problems you have with depth perception. Now, you don't have to look ahead of the car because the corner is always in view, but it is much farther away. This last part of this exercise is much trickier than it sounds.



THE SHIFT

Mark the corners of a 5-foot square on the street with chalk. Next, place a marker at diagonally opposite corners of the square, and follow my diagram to build the rest of the course. The goal with this setup is to practice going through chicanes properly. The extra cones give you a sense of space for entry and exit. Tracks always have outside and inside barriers, so your courses should have a reference for these, too. Practice entering the chicane as fast as possible and time yourself. Set the start and stop markers at about 10 feet before and after the entrance and exit of the chicane. This will help you to measure your entry and exit speeds as well as how you negotiate the chicane itself. As with all these exercises, change your driving position so you have to negotiate this from different angles.



THE CAROUSEL

This is typically one of the toughest places to get right on any track, so practicing this type of turn is useful. The tricks to any carousel are entry and exit speeds and angles. These are dictated by how "continuous" the carousel turn is. Think of a degree wheel when you visualize this. If you enter the carousel counterclockwise at 45 degrees and exit at 90 degrees, you'll run a continuous carrousel-type turn. This will require lots of throttle control and steady steering input because the car is in the turn so long. At the other extreme—and the most common way—you enter the carousel at the 360-degree mark and exit at the 90-degree mark. The idea is for the car to carry a continuous arc nice and smooth. This will teach you to make subtle throttle and steering inputs to keep this nice smooth arc. Don't worry too much about timing yourself on this one; you will know when you start getting this right.

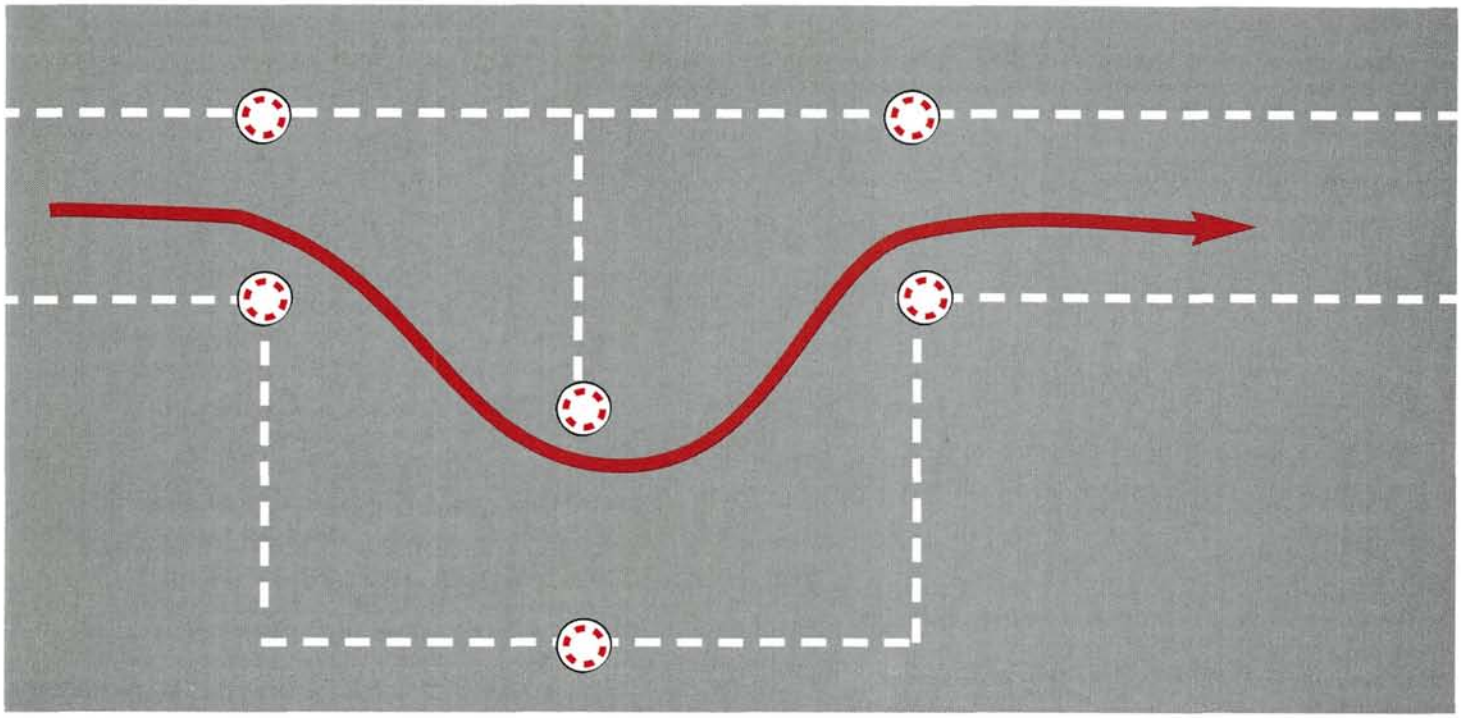
MAKING TRACKS

Road Domes are shown in the photo and illustrations (visit roaddome.com), and corner dots are available from other manufacturers as well. But RC-specific track markers aren't a must-have; you can easily lay out a track (or sections of one) for practice using ordinary household items. For example:

>> **Garden hose.** Just lay it out to form any sort of curve or bend.

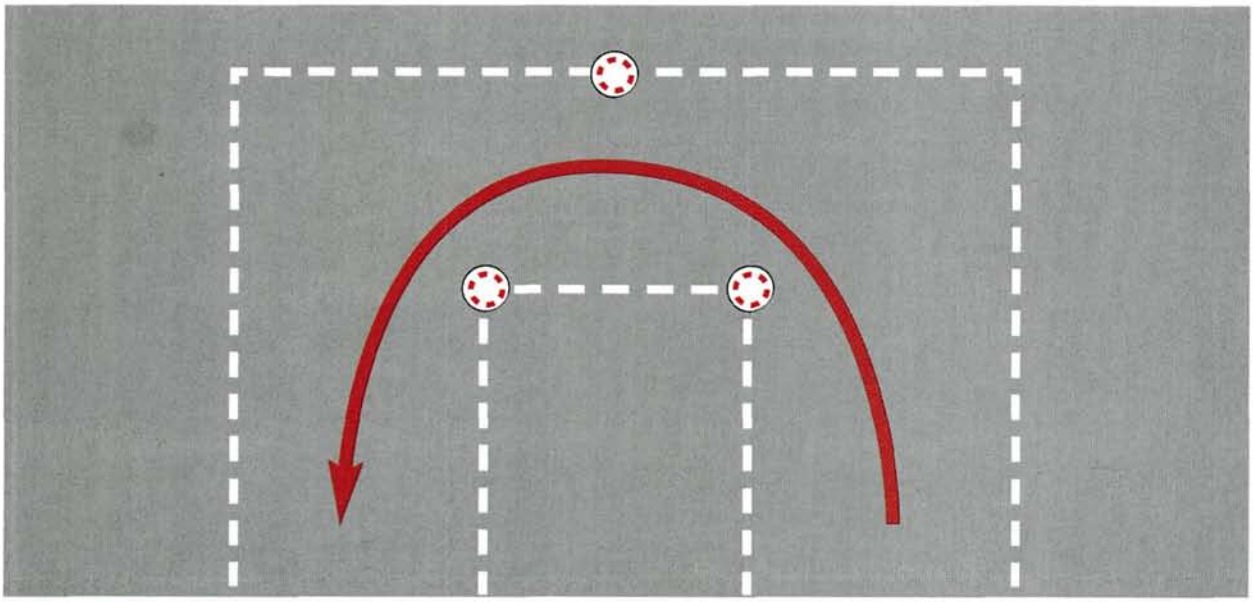
>> **Plastic bottles.** Fill them with a little sand so they stay put, and you've got free corner markers.

>> **Chalk.** You only need "hard" markers at key turning points on the practice track; connecting straights can be simply drawn with sidewalk chalk.



THE CHICANE

Mark the corners of a triangle using this diagram as a reference. This exercise simulates a chicane entering a straightaway. This exercise is all about controlling entry speed and trying to apply the throttle as soon as possible to get down the straight. I've seen these types of sections on many tracks, and they are always make-or-break sections when it comes to lap times. I also have to admit to not being very good at these. Make sure that you keep your entry and exit width narrow enough to simulate a real track, or this exercise is totally useless. The toughest part is getting the car to accelerate and turn within the width of the track without pushing out to the wall, so keep your lane widths tight.



ROUNDING OFF A SQUARE CORNER

A handful of us are lucky enough to race on permanent circuits such as the Tamiya track in California or the Hamilton Ohio Scale Auto Raceway track in Cincinnati, OH; they have nice flowing turns with rounded curbs, etc. But most of us run on parking-lot tracks built with 2x4s that form really square corners that tear complete suspension components out of any cars that hit them. This exercise is designed to help you to round off such corners with confidence. The setup for this is quite easy: just place two markers about 6 feet apart, and follow the entry and exit shown on the diagram. The technique is very similar to the one for the carousel exercise, but you have to figure out which is the most efficient arc to connect the two cones. By playing with yout exit-turn position, you will determine which type of arc works best, so change the course to get the most out of this exercise.

With any of these exercises you must keep the lane width true to the track width you encounter at your local track, and always change your driving position at least once and then try the course again. In the end, I think you will find that your driving will start to improve and you will be able to learn how to handle new track layouts much faster. ■

RTR Clutch Maintenance

Get the grab back

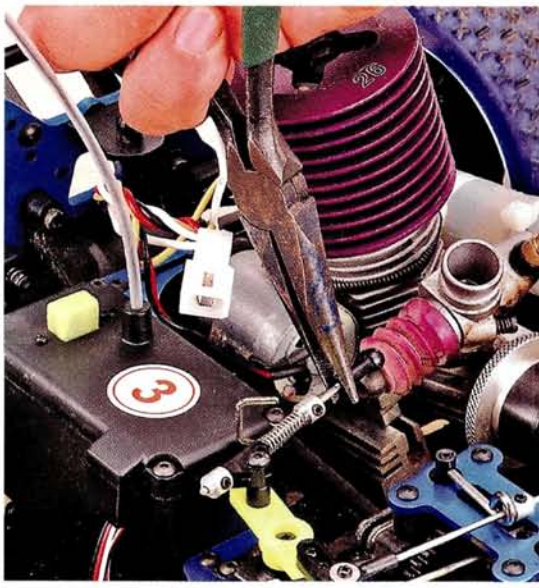
Getting a new RTR is great. There's no assembly; just put in some batteries and fire it up! But you won't have the intimate knowledge of your new ride's inner workings that you have when you build it from a box of parts. When parts wear out or break—and if neither happens in the first months, you aren't driving hard enough!—you're left hanging. Fortunately, we're here to help. Other than the glow plug and batteries, the first to go will probably be the clutch. Even if you haven't had any problems with your RTR yet, it's a good idea to inspect your clutch every five to 10 runs. Check out the steps below to keep it in good order.

WHEN TO WORK ON YOUR CLUTCH

The first sign that your clutch needs attention is that your car doesn't have as much punch as it used to even though the engine is properly tuned. Low punch may mean that your clutch is engaging too soon or that it isn't gripping the clutch bell tightly enough. If the clutch stutters before it grabs, the shoes are probably worn or one of the springs has weakened. If you car runs properly but stalls when it slows down, the springs might be bad or broken, and the shoes aren't disengaging from the clutch bell, and that causes the engine to stall.

STEP 1 REMOVE THE ENGINE

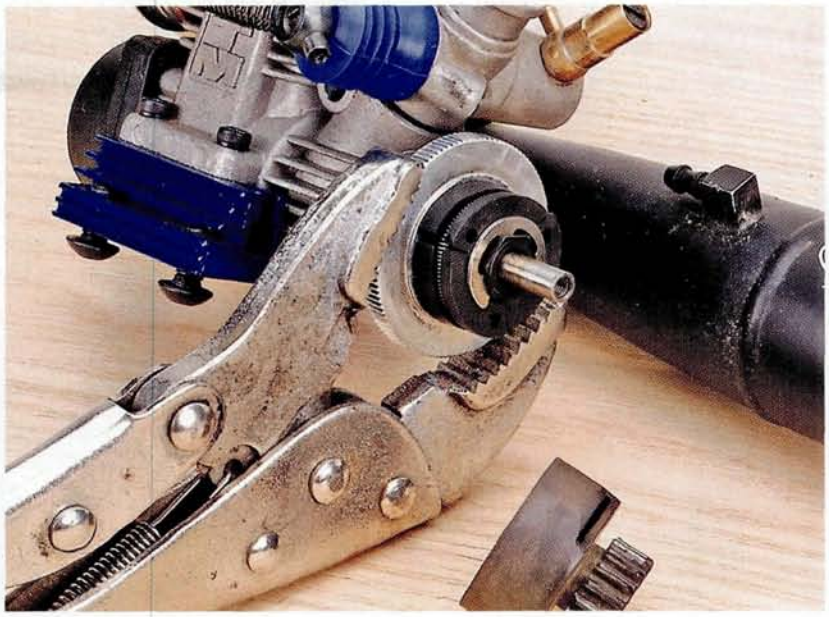
Before you take the engine off the chassis, remove the fuel lines, the throttle linkage and the pipe support. If the throttle wire has a Z-bend rather than a ball cup, it might be easier to remove the servo horn and brake linkage. Some cars have braces that you must remove before you can remove the engine. Remove the four screws that secure the engine mounts to the chassis; these are usually identifiable by the oval mounting holes that allow gear-mesh adjustment.



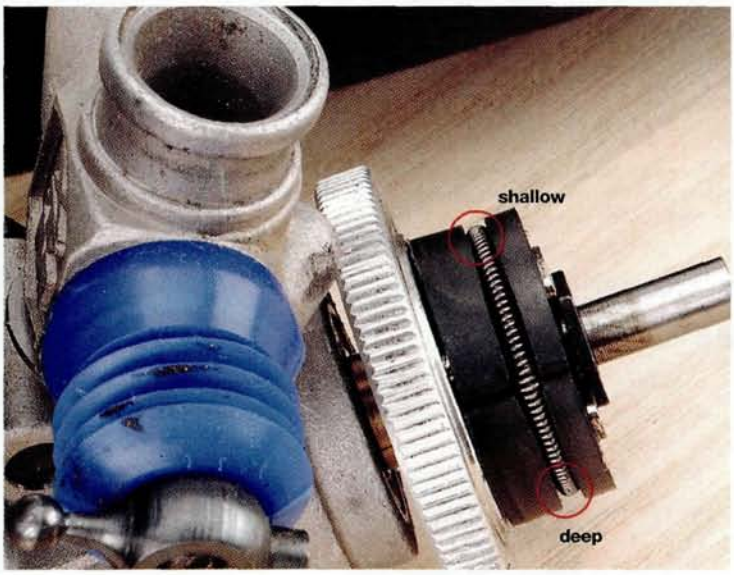
With a ball-cup throttle linkage, removal is easy; just use pliers. If it uses a Z-bend wire, removing the servo horn will make it easier. Many touring cars have braces that must be removed to take the engine off the chassis.

STEP 2 REMOVE THE CLUTCH BELL & CHECK THE BEARINGS

A screw at the end of the crankshaft usually secures the clutch bell, but some cars use a snap ring or an E-clip to keep it in place. If your clutch has an E-clip or a snap-ring on the end, pry it off with a small flat-blade screwdriver and pliers. Take note of any washers that might be between the bearing and the screw or the E-clip. Check the bearings; if the clutch bells don't spin freely, replace the bearings or lubricate each with only one drop of oil (you don't want excess oil to be flung out and onto the inside of the clutch bell). If everything looks good, set the clutch bell and bearings aside.



To prevent the crankshaft from rotating when you remove the screw, hold the flywheel with vise grips or channel-lock pliers.



STEP 3 INSPECT THE CLUTCH SHOES

Check the clutch shoes while they are on the flywheel. There's a groove in each shoe for the clutch spring to sit in. As the shoe wears, the groove becomes shallower. If there is eventually so much wear that the spring touches the clutch bell, it is time to replace the shoes and the springs. If you have a wraparound spring (as shown), you absolutely must not let it wear down all the way. With only one touch of the clutch bell while it's running, the spring will break, and you'll have a mess to clean up.

Note that one of the shoes is so worn that the spring is dangerously close to touching the clutch bell. If it touches the clutch bell during a run, the spring will snap almost instantly. Compare it with the bottom shoe that has a deeper spring groove.

STEP 4 REMOVE & INSPECT THE CLUTCH SHOES

Shoes with wraparound springs are easy to remove. Take the retaining E-clip off, and slide the shoes and spring off the flywheel pins in one piece. Individual shoes and springs are a little trickier. Use a flat-blade screwdriver to pull a shoe away slightly, and use another screwdriver to pop the adjoining spring up and out of the groove. Repeat this for all the shoes. Check the backs of the shoes; if a pivot hole seems to have grown larger, especially on the side that touches the flywheel, replace them.

The shoe on the left shows lots wear on its face and on the spring. There is little wear on the face of the right shoe, but the pivot hole looks larger than it should be.

STEP 5 INSPECT THE SPRINGS & CLUTCH BELL

Springs can weaken with age and because of heat. Check the springs and look for differences in spring angles. If any springs are out of shape, the clutch shoes will not engage simultaneously; this increases shoe wear and leads to unpredictable clutch performance. Clean the inside of the clutch bell with a clean rag and motor spray to remove any grease that could degrade the clutch's performance.

The left spring shown here has been tweaked by heat and bad spring tuning; it should be replaced. The spring on the right is in good condition.

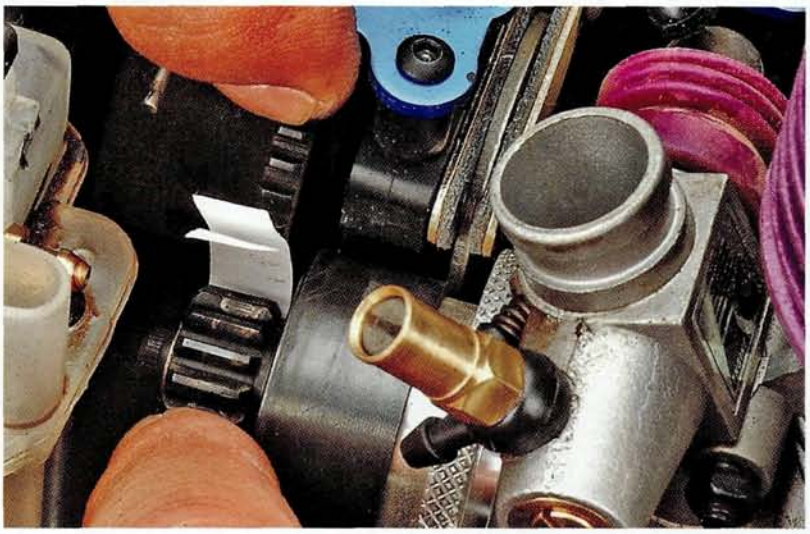
STEP 6 REASSEMBLE THE CLUTCH

A wraparound spring is easy to install, so it's no wonder that they're used on so many RTRs. Mount the shoes on the flywheel pins, hook the spring ends into a loop and roll the spring around the shoes. Insert individual springs into the shoes, and line up the spring hole and the shoe hole as well as you can. Next, use your hands to slide the spring's short "arm" onto the pin as far as it will go. Use one hand to hold the shoe and spring in place, and use a flat-blade screwdriver to seat the spring. Reinstall the clutch bell and bearings, and don't forget the washers. Use a dab of blue thread-lock on the screw; be sure not to get any of it on the washers and bearings.

It can be tricky to install clutch shoes that have individual springs. Use one hand to hold the engine, and press the shoe into place while using a screwdriver to seat the spring. Patience and experience go a long way here.

STEP 7 REMOUNT THE ENGINE & SET THE GEAR MESH

With the engine reinstalled, pay attention to the gear mesh, or you might be replacing the spur gears before your vehicle even hits the track again. If you can insert two strips of paper between the spur gear and the pinion, that's just the right gear mesh for most cars and trucks. Push the clutch bell against the spur gear with the paper in place, and tighten the mounting screws. A mesh that's too tight will slow the car down and wear out the gears and bearings; too loose, and you risk stripping a gear.



When you reinstall the engine, it's critical that you set the gear mesh properly. If you can feel play between the spur and pinion gears with two strips of paper between them, the mesh is too loose.

STEP 8 REINSTALL THE FUEL LINES & LINKAGES

Replace the throttle linkages, the fuel lines (be sure to keep them away from the flywheel and clutch bell) and the pipe mount (which I too often forget). Do a radio test to make sure that the throttle opens smoothly and closes properly. When you first start your engine with the reassembled clutch, make sure that your vehicle's wheels are off the surface in case there are any problems. ■

Everything is reinstalled and ready for a radio test and a bench test before we head back to the track. After such a maintenance session, testing your gear before you hit the track can save you a lot of frustration.

FIND IT

››› Go to page 219 for manufacturers' contact information

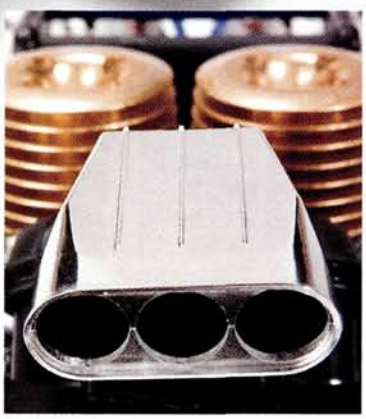
BY KEVIN HETMANSKI | PICS BY PETE HALL

Project: Giga Crusher

Two Collari engines, one powerful truck

Any high-horsepower monster-truck fan will choose the dual-engine "DE" Kyosho Giga Crusher over the single-engine version, but the truly power hungry will ask themselves, "How much better would it be with two fire-breathing competition engines instead of the standard sport powerplants?" That's exactly what went through my head, and thus, this month's project was born: a Giga Crusher that can totally Giga-crush any other truck. Along with a pair of Collari engines (combined output—7 horsepower!), I installed Kyosho's factory options, added Pro-Line gear and custom-machined a few bits myself. It's easily the most powerful monster I've ever built or driven—and trust me, I've driven some powerful monster trucks!

Pro-Line Moab tires and Commando Bead-Loc wheels were definitely the way to go.



Yup, the scoop is functional. I removed the screen and painted the inside black to give it a more scale appearance.

THE PARTS

BASE KIT
Kyosho
- Giga Crusher DF–311428, $630

CHASSIS
Kyosho
- Main chassis–GGW01, $49
- Underguard–GGW09, $6
- Sub chassis (2)–GGW02, $8
- Roll-bar handle–GGW07, $4
- Cross-member (2)–GGW06, $6

DRIVETRAIN
DuraTrax
- 5x8 ball bearings (8)–DTXC1523, $3/pair

Kyosho
- TCD differential (2)–IFW119, $105 each

SUSPENSION & STEERING
Kyosho
TITANIUM
- Upper suspension shafts–GGW11-20, $10/pair
- Lower suspension shafts (4)–GGW11-35, $10/pair
- Lower suspension shaft (4)–GGW11-78, $13/pair
- Upper suspension shaft (4)–GGW11-45, $10/pair
- Shock stay–GGW03, $8
- Suspension plate–GGW05, $6
- Steering plate–GGW04, $5
- Rear shock set 3.5 shafts (8)–IFW141, $60/pair
- Shock bushings (8)–BSW041, $13/set of 4

ENGINE & ACCESSORIES
Collari
- LC30MT engines (2)–WRXLC30MT, $315 each

New Era
- 3-pin billet-aluminum fly wheel .21 to .28 w/spacer (2)–KMF519, $25 each

Pro Boat
- Shockwave 36 tuned pipe (2)–PRB2056, $45 each

Team Losi
- Nomex Heat-Shield w/adhesive–LOSA9343, $5

ELECTRONICS
Futaba
- 3PK radio–FUTJ2901, $370

Hitec
- HS-5998TG servos (2)–35998S, $115 each

Trinity Products Inc.
- Nitro Metal Hydride 1200mAh receiver battery pack–RC5304, $30

BODY, WHEELS & TIRES
Pro-Line
- Ford F-650–3193-00, $34
- Moab 40 Series tires (4)–1117-00, $37/pair
- 40 Series Commando Bead-Loc wheels (4)–2680-01, $45/pair

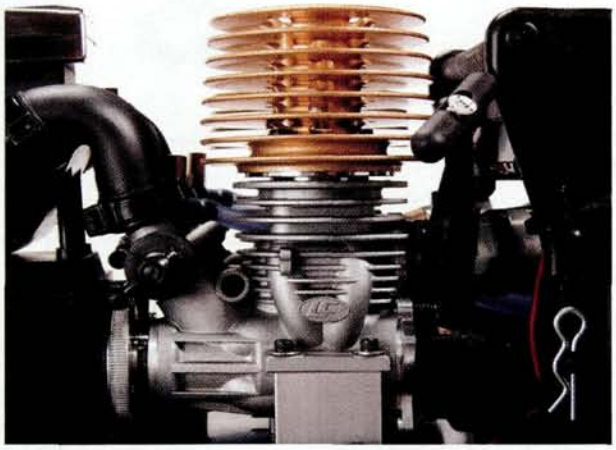
Total cost: $2,923

CHASSIS MODS

I started off the project by replacing the Giga Crusher's silver-finished aluminum parts with Kyosho's blue-anodized option parts. Before I installed the chassis, it saw some time on my milling machine. I shortened the side tabs so they don't extend past the plastic side plates and milled out slots for the custom engine mounts I had to create to fit two Collari engines. The chassis is drilled for the stock engines' cast-in mounting bosses, so standard engine mounts aren't a direct fit. The slots I made allow me to install the Collaris and adjust the gear mesh between the clutch bell and spur gear. For better access to the dual powerplants, I removed the front roll-cage bars. This also cleans up the look of the chassis.

THE ENGINES

Collari's LC30MT .30 engine has a claimed output of 3.5hp, and it is available with either a pull-start or a socket for a Roto Start. I chose the pull-start version because I won't have access to the back of the engines once they are installed. The engine has the same footprint as a standard big-block engine, so it will fit any truck designed to run a .21 through .28ci powerplant. ABC construction, dual-needle slide carb, heavy-duty pull-start and a large gold-anodized heat-sink head keep it standard, and massive "ducts" cast into the engine's case help it flow big gulps of fuel into the combustion chamber.



STUFFING THE ENGINES IN

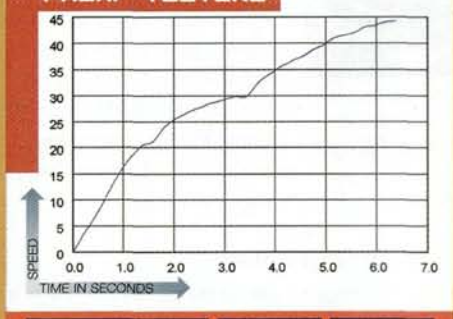
I know you must think I'm crazy to want more power out of this truck; after all, this truck already comes with two .26 size engines in it. They're a bit on the tame side, though, and I know more powerful engines are out there. I gave the guys at Werks Racing a call and ordered a pair of Collari .30 pull-start engines for my truck. The stock engines use cast engine mounts on the bottom of the engines to attach them to the chassis. Since these engines don't have that kind of mount and a conversion kit isn't currently available, I had to make my own. A few pieces of ¼-inch-thick aluminum did the trick. These engines weren't easy to install. I had to grind the spur-gear case and tweak the carbs to get them in. I actually had to grind off a rib on the side of the right engine's carb to clear the carb-linkage pivot. The gap between the engines' heads is about 1mm. Talk about a tight fit!

BEHIND THE WHEEL

Before I even had the tires on the truck, my curiosity got the best of me, and I had to start up at least one engine to hear how it sounded. On the second pull of the starter, I jumped at least 5 feet off the ground—I didn't expect to hear the loud crackle that came out of the tuned pipe. Since one engine sounded so cool, I decided to fire up the other as well. I blipped the throttle a couple of times, and the dual engines sounded like a top fuel dragster staging for a run. As the engines went in and out of phase, the exhaust note loped with a snarling melody that got me psyched up to finish the build and get the truck running for real.

When the Giga Crusher was at last ready to roll, I broke in the engines and tuned them individually before running them simultaneously. I couldn't wait to hear both engines reach their high notes together, and when it was finally time to pull the trigger, the truck sounded even wilder than I hoped. I could actually feel the exhaust pulses from the rear-facing pipes, and their stereophonic roar was the most scary, beautiful sound I've ever heard in RC. And driving the monster was amazing; with the dual engines up front, the Giga Crusher stays planted on hard launches instead of flipping onto its roof. It's not as quick off the line as you would think (it's still a heavy truck, and I didn't alter the gear ratios), but it moves out in a hurry, and when it shifts into second and third, you can see the suspension squat as the engines unload all their power into the tires. Best of all, the truck was as reliable as an RTR. I thought it would be a high-strung monster, but as long as I kept fuel in the tanks, all I had to do was enjoy the ride—and it's a wild one. There are faster trucks out there, but no truck I've driven has given me a sense of mega-power like the Project Giga Crusher.

RADAR TESTING



Distance (in feet) traveled in:	0-132 ft. time	Speed at 132 ft.
1 SEC. 12.2	4.0 SEC.	35.1 MPH
2 SEC. 43.4		
3 SEC. 83.9	Time to top speed	Top speed
4 SEC. 130.1	6.4 SEC.	44.2 MPH
5 SEC. 185.1		

The Pro Boat pipes look badass and are much less restrictive than the stockers. I polished the raw aluminum pipes to brighten them up.

BOMB-PROOF CLUTCH BELLS

I replaced the stock needle bearings with 5x8 bearings (seven in each clutch bell). I did this because the needle bearings can't handle high rpm. When I run a two-engine truck, I run one engine, tune it and then shut it off. Then I do the same to the other before I start both engines.

HIGH-FLOW PIPES

The stock pipes on the Giga Crusher are heavy and restrictive, so I replaced them with a set of Pro Boat tuned pipes. Why not car pipes? Because I needed a straight-shot, stingerless configuration, which isn't used in the car world but is standard for hi-po boats. The Pro Boat pipes have a much better flow and are much lighter than the stock units. They came with a dull aluminum finish, so I clamped them into my lathe and polished them. They're attached directly to the engines' exhaust ports with silicone couplers. Nothing flows exhaust as efficiently as this type of setup. It should also be hella loud!

The stock plastic-body shocks had to go. I replaced them with a sweet set of rear shocks from the MP 777 Special 1.

ALUMINUM SHOCKS

I was afraid the stock Giga Crusher shocks' bottom caps would pull off the shock bodies if the suspension topped out hard with the weighty Pro-Line Moab/Commando Bead-Loc combo on the ends of the arms, so I replaced the stock parts with a set of Kyosho MP 777 Special 1 rear shocks. I also installed stiffer Kyosho springs (white) to support the chassis' weight.

HEAVY-DUTY DIFFS

When you try to put 7hp through a set of diffs, it's only a matter of time before you blow them up. The more pressure there is on the bevel gears in the diff housing the more they push away from each other. The plastic housing can only hold its shape for so long, and if it flexes a little, you can kiss the diff good-bye. The Kyosho TCD diffs I installed have hardened steel gears and side bevel gears supported by steel blocks. I highly doubt that I'll blow these suckers with all that support inside.

23MM HEX CONVERSION

Pro-Line's 23mm hexes weren't designed to fit the Giga Crusher, so it was time to fire up the lathe. I drilled out the hexes so they would fit over the Giga Crusher's axles. I had to grind the slots in the back of the hexes to fit the stock drive pins; the pins were slightly too long for the slots. The stock wheel nuts have large flanges that won't fit inside the hex, so I replaced them with smaller nylon locknuts. With that all set, I installed a pair of Moab tires on them. The tires provide plenty of traction on all surfaces, and their large diameter gives the truck a little more top speed, thanks to the taller gearing that accompanies it.

Beefing up the diffs was a must on this truck, especially with 7hp running through them.

ENHANCED STEERING

Because of its front-mounted engines, the Giga Crusher carries a lot of weight over its front tires. That means that the steering servo has to work extra hard, so I installed a Hitec HS-5998TG servo to do the job. It puts out 250 oz.-in. of torque, and it is equipped with a heat sink and a titanium-gear drivetrain. If that servo can't turn the wheels, nothing can.

POWERFUL BODY AND WHEELS

I wanted a beefy-looking truck, so I went with a Pro-Line F-650 body. I love how tough it looks; it screams muscle, especially with trick paint work courtesy of Bill Zegers. The blower works well with the hood line, and the extended cab protects the dual engines. Pro-Line's 40 Series Commando Bead-Loc wheels complement its F-650 very well and spared me the trouble of gluing the Pro-Line Moab treads to the wheels. Turning screws beats gluing your fingers together any day. ■

FIND IT
>>> Go to page 219 for manufacturers' contact information.

Fast fueling facts

Most fuel bottles don't come with instructions, and the manuals included with vehicles rarely provide more information than "fill the fuel tank; then...." Granted, filling the fuel tank isn't rocket science, but it isn't self-explanatory either. This month's "Piston Power" is dedicated to providing you with more information on how to refuel your nitro machine properly.

FUELING BASICS

All nitro machines can be refueled with the engine running. I just thought I'd clear that up because I've seen people shut down their engines so they could top off the fuel tank for another run. Typically, the fuel tank is readily accessible, and you can refill it without removing the body; that's one reason why bodies often have a hole in their windshields or a side window cut out.

Nearly all modern nitro rigs come with quick-fill caps. They're hinged and spring-loaded, and O-rings seal them to the tanks. They're designed to be opened quickly and easily and to allow the nozzle of a fuel bottle to be inserted into the tank for refueling.

Refueling with a fuel bottle is as simple as holding the flip-top filler cap open and gently squeezing the fuel bottle. Once the tank is filled to capacity, let the filler cap snap shut.

FUEL BOTTLES

A newcomer might wonder how you get fuel from the open window to the fuel tank's filler cap. Some try to pour fuel from the quart or gallon container into the open fuel tank (sometimes using a funnel, but not always) while others use an airplane-style fuel pump to slowly pump the fuel into the tank. Both methods work, but neither is as effective as using a simple fuel bottle.

An experienced driver fills fuel bottles without much thought, but I've seen people pull the top off a fuel bottle to pour the fuel into it. The proper method of filling a bottle happens to be the simplest; simply squeeze the air from it, insert the tip of the nozzle in the fuel container and suck the fuel into the bottle. You may have to do it twice to fill it completely, but it's still the easiest way to fill it.

Squeeze the air out of the fuel bottle; then stick the filler nozzle into the original container to draw the fuel into it. It may take a few tries to completely fill the fuel bottle, but a big 500cc bottle like this will refill a big ⅛ machine four times.

Filling your tank is a simple operation. Flip open the cap, insert the nozzle and give the fuel bottle a gentle squeeze to force the fuel into the tank. You don't want to take the time to pour the fuel into the tank. That takes forever, and it won't allow you to draw fuel back into the fuel bottle when the tank gets too full.

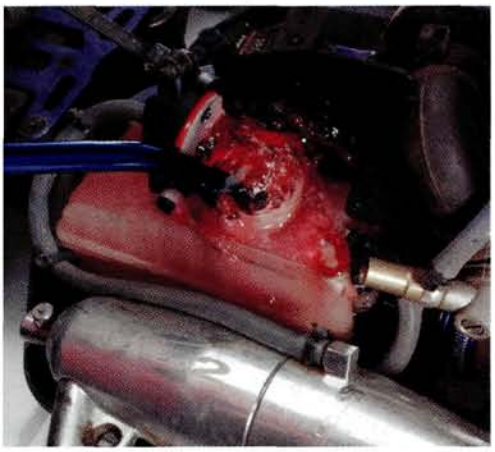
THINGS TO REMEMBER WHEN REFUELING

STAY OFF THE THROTTLE. If you're a two-man team, and someone refuels the tank while you drive, don't rev the engine while it's being refueled. The sudden burst of vibration will cause fuel to "boil" out of the tank, and that will prevent the fuel tank from being filled to capacity. Let the engine idle while the fuel-tank lid is open, and wait for your pit man to indicate the tank is full before you apply the throttle.

KEEP THE BRAKES ON. It's best to apply the brakes when someone else is refueling your vehicle. Nobody likes having churning wheels turn their arms into hamburger as they're pitting a car. Do your pit crew a favor: stay on the binders while they tend to your car.

DON'T OVERFILL THE TANK. Everyone is tempted to overfill their fuel tank. Bashers and racers always want the longest run times possible. When you race, you always want to fill the tank as quickly as possible, and that can lead to overfilling. Excess fuel that drains onto the chassis will cause dirt to stick to the chassis, and it will usually saturate the brakes with oil and fuel. Fuel on the brake discs and soaked into the brake pads will prevent your brakes from grabbing properly; clean it off with a solvent.

PUSH THE FUEL CAP INTO PLACE. Once the tank has been refilled, give the filler cap a quick push with your finger to ensure that it's closed. The O-ring seal on many fuel tanks prevents the filler cap from completely seating by spring pressure alone, which causes the pressure from the pressure line to bleed off. Let the filler cap snap back into place, and follow up with a quick push on the filler cap to be sure it's seated and sealed.



Don't overfill the fuel tank. Even the built-in overflow channel can't handle unlimited amounts of spilled fuel.

WATCH OUT FOR FLAMEOUT. The air and fuel displaced when you close filler cap increases pressure in the fuel tank, and that temporarily forces extra fuel into the engine. This is the point at which the engine is most likely to flame out. Rev the engine once before you put the vehicle back on the ground to clear out excess fuel.

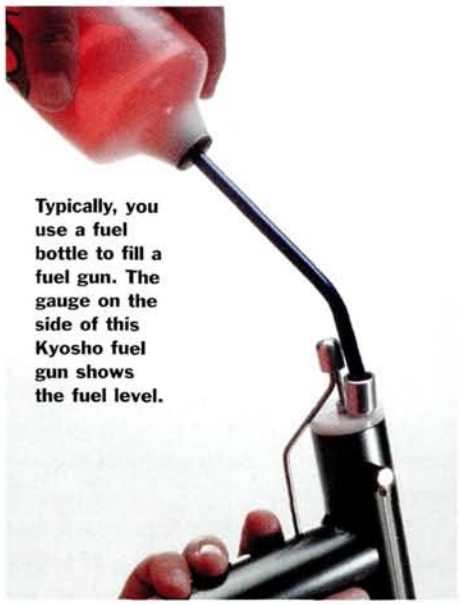
Press on the filler cap to be sure it's properly seated; otherwise, a pressure leak may result, and the mixture may go lean as the fuel level drops.

BE READY TO RESTART THE ENGINE. A flameout that results from refueling is not an issue for a basher; you simply restart the engine and continue with the mayhem. If a racer's engine stalls, however, it's time lost on the track; the speed at which you restart the engine often makes the difference between winning and losing. Be prepared to restart the car you're pitting; have a starter box (if necessary) and a glow igniter on hand so you don't have to run back to your pit table to restart the engine.

A fuel gun is an expensive but very quick and accurate means of filling the fuel tank.

WHAT ABOUT FUEL GUNS?

Fuel guns were developed by 1/8-scale on-road racers for ultraquick refills with little overflow. Stopping the car and hauling it over the pit wall is the most time-consuming part of a pit stop, so a fuel gun will save you a second or two per pit stop, and that will give you an advantage over those who use fuel bottles.



Typically, you use a fuel bottle to fill a fuel gun. The gauge on the side of this Kyosho fuel gun shows the fuel level.

A fuel gun has a large opening and vents that allow massive amounts of fuel to flow into the tank in a short period of time. The vents on the filler neck become plugged when the tank is full, and fuel stops flowing immediately. It takes only a second or two to fill a tank, and overfilling is uncommon. It's a handy accessory for a serious racer but costly and unnecessary for a basher.

USING A FUEL GUN. A fuel gun is not designed to store fuel; it's just a means of refueling. Many of them don't hold fuel well for long, so to limit leakage, it's best to fill them (with fuel bottles) just before pit. Some fuel guns have fuel gauges so you can see how much fuel is in the gun. Top off the fuel gun before you call your driver into the pits for a refueling. As soon as the car is pulled over to the wall and the filler cap is opened, insert the tip of the fuel gun into the tank, and pull the trigger. A few seconds later, the tank will be full, and the car will be on its way. It's a good idea to have a plastic bucket handy (an empty fuel bottle with its top cut off will also work) to catch any fuel that drips from the gun before and after pit stops. ■

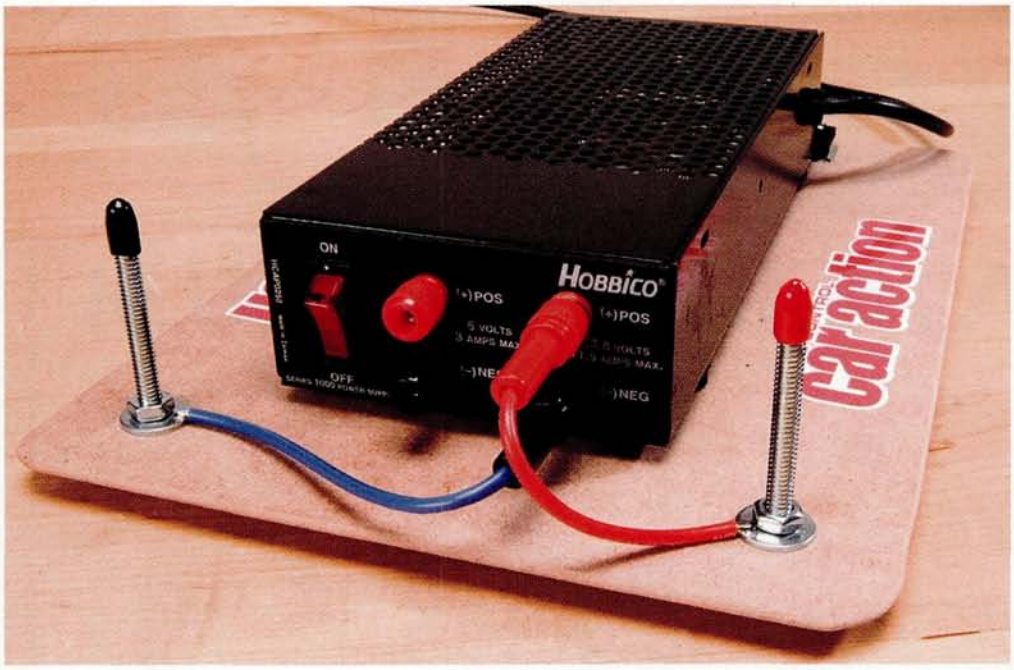
Power Projects

GET CONNECTED!

Anybody can buy stuff at the shop; it's the custom gear that makes your pit extra cool. Here are a couple of simple power projects to help you jack into your power supply more easily and juice up your motors for testing, break-in, or lathe operation.

POWER POSTS

So many alligator clips, yet so few connections on your power supply. Stop stacking those clips—build a base with power posts instead.

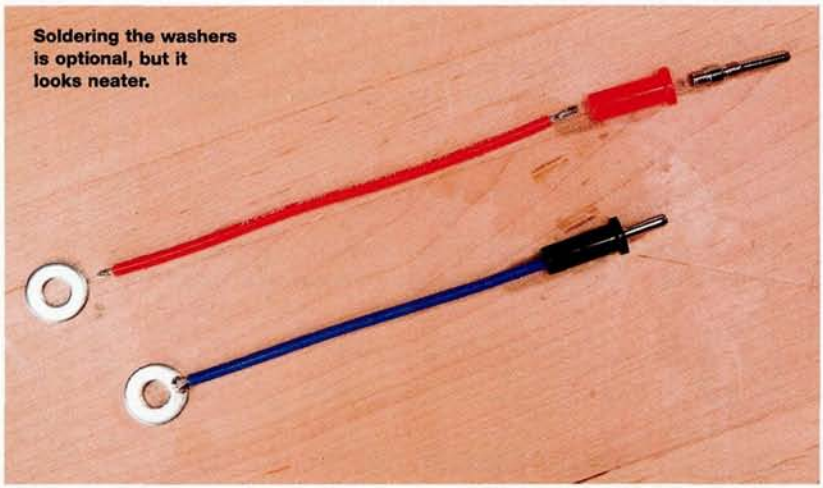


You'll need

- Stiff plastic or Masonite sheet (about 8x10 inches)
- ¼x2½-inch bolts (2)
- ¼-inch nuts and washers (2 each)
- RadioShack 64-2342 rubber pads
- RadioShack 274-741 banana plugs
- Red and black 14-gauge silicone wire (about 5 inches of each)

STEP 1 ASSEMBLE THE BANANA PLUG LEADS

Install the banana plugs first. Strip and tin the wires, insert them into the plugs and solder them into place. Next, strip about ½ inch of insulation from the opposite ends. The exposed ends will simply be crushed between two washers, but if you want a neater installation, you can solder each wire to a washer instead.

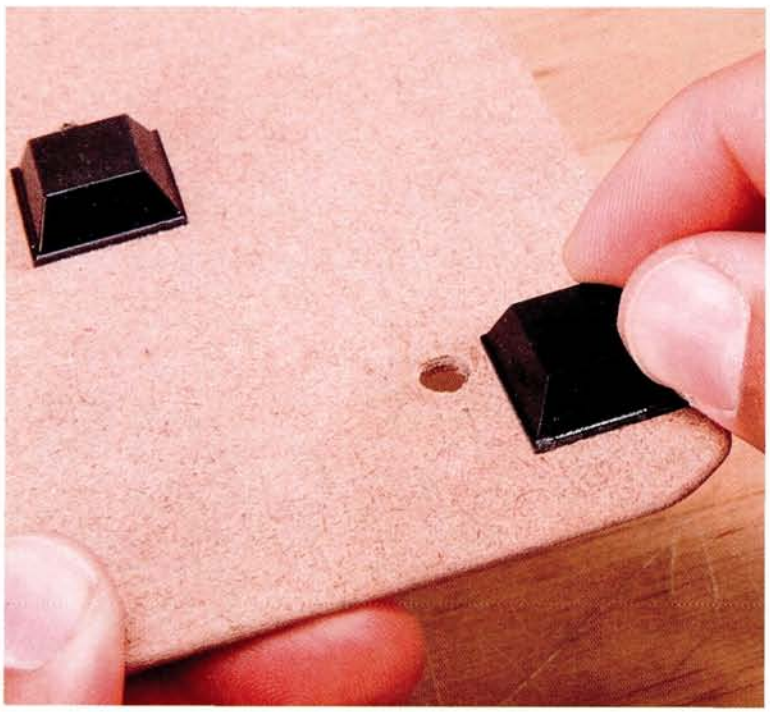


Soldering the washers is optional, but it looks neater.

STEP 2 PREP THE BASE

I'm using a cheap cutting board as the base, but you can use anything stiff and nonconductive. Place your power supply on the board; then mark the post locations. The posts should be at least 4 inches apart to prevent shorts. Drill two ¼-inch holes for the posts, and then stick the rubber feet onto the board. My cutting board is more flexible than I like, so I stuck an extra foot under each post.

Make sure that the post locations are reasonably far apart to prevent shorts and so they don't interfere with access to the power supply.



In addition to making the base slip-resistant, the feet will prevent the bolt heads from making it tip.

Here's the completed negative post. You can find vinyl caps at the hardware store.

STEP 3 INSTALL THE POSTS

Insert a bolt through one of the holes, and follow it with two washers. Insert a wire between the washers, and then tighten the nut to hold it. If you soldered the banana plugs to the washers, you can skip the second crush-washer. Finish by labeling the posts positive (red) and negative (black) with colored tape, paint, or vinyl caps (for the most factory look).

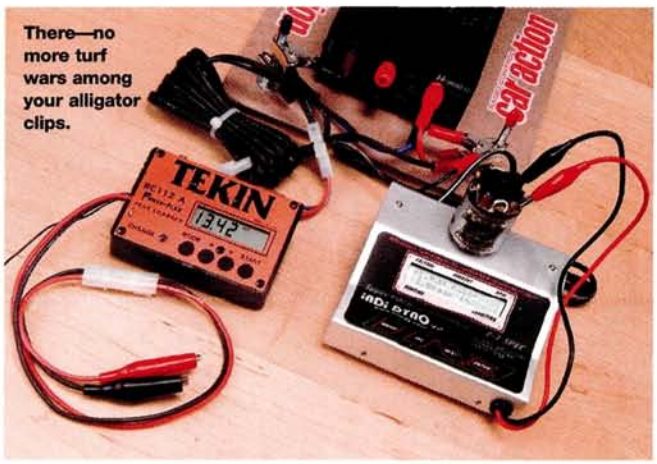
STEP 4 MOUNT THE POWER SUPPLY TO THE BOARD

You could just use strapping tape, but the trick method is to use the screws that hold the power supply's feet in place (if so equipped). Drill the board to match the hole locations; then install the power supply. You may need to use longer screws.

If I had left the rubber feet off, I could have used the stock screws to mount the power supply to the board, but I wanted air to circulate under the power supply. Longer screws did the trick.

STEP 5 PLUG IT IN AND START CHARGING

Insert the banana plugs into the appropriate sockets, and you're good to go.



There—no more turf wars among your alligator clips.

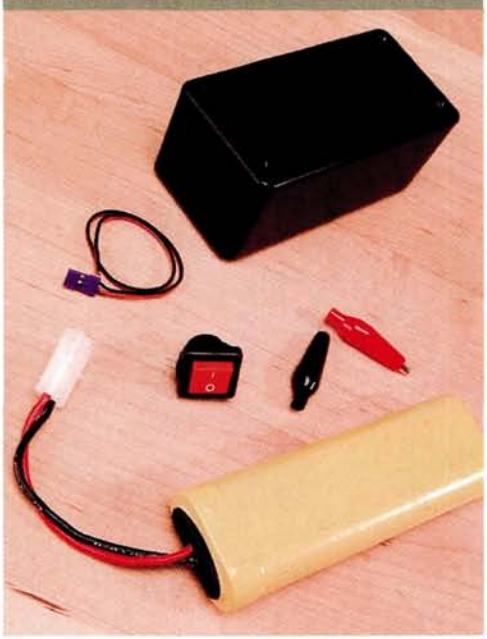
POWER BOX

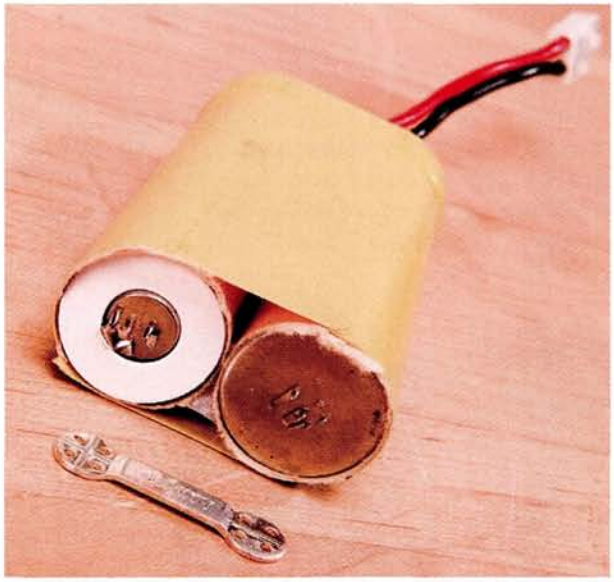
A 4-cell pack is handy for breaking in motors and running lathes, but carrying a loose side-by-side pack in your pit box is a short circuit waiting to happen. A switched power box is a much better option. It's basically just a smaller version of the bump box we built in the last issue.

Power up with the flip of a switch.

You'll need

- RadioShack 270-1803 project box
- RadioShack 275-690 rocker switch
- 14-gauge silicone wire (red and black)
- 4-cell battery pack
- Servo lead (optional)





STEP 1 ASSEMBLE THE PACK

You can just lop 2 cells off a stick pack or solder 4 loose cells in the traditional side-by-side arrangement.

Remove 2 cells, add a bar and—presto!—instant 4-cell pack.

STEP 2 PREPARE THE BOX

Drill a 3/8-inch hole in the front of the box for the wires to exit and a 3/4 hole in the lid for the switch. Don't have a 3/4-inch drill bit? Use the largest bit you have, and then enlarge the hole with a rotary tool.

You may need a rotary tool to make the 3/4-inch switch hole, but a reamer is fine for the wire exit hole.

STEP 3 INSTALL THE SWITCH

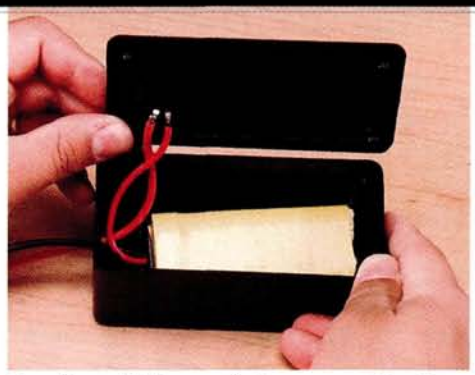
Slip the switch into its hole and tighten the mounting nut; then solder the pack and the positive lead to the switch. The negative wire can simply exit the box, but if it isn't as long as you'd like, splice an extension onto it.

Solder the pack to the switch so the positive lead is interrupted.

You need only hand-tighten the plastic nut.

STEP 4 ASSEMBLE THE BOX

Slip the red and black wires through the hole in the front of the box, drop the pack in and then secure the lid. If the pack rattles, use foam or wadded paper to pad it.

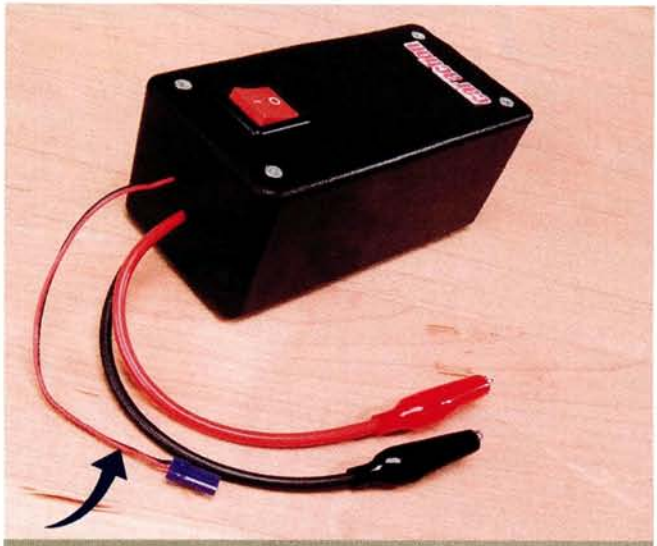


Close it up with the supplied screws, and the job is almost done.

STEP 5 INSTALL ALLIGATOR CLIPS

Slip the plastic sleeves over the wires first. Then strip and tin the wires, and insert them into the clips. Heat the joint, and add a little more solder; the job is done. To charge the box, just clip the leads to your charger, and make sure that the box is switched on. When you use the box, always remember to turn it off; otherwise, the loose alligator clips will short if they touch each other. ■

Don't forget to slip the clips' insulating sleeves over the wire before you solder the clips.



PORTABLE SERVO POWER

Whenever I build a kit, it seems I never have a charged pack handy to power up the receiver and servos for centering. That's why I added a servo plug to my power box. I just snipped the lead from a broken servo, removed the signal wire, fed it into the box and soldered it to the pack. ■

PRO-LINE **40 Series Commando Bead-Loc 23mm HD wheels**

When you think about it, gluing tires to wheels is downright dumb. You can't reuse the rims, you can't swap tires and the whole gluing process is a sticky pain in the rear. Plus it's expensive, especially when you're talking about replacing monster truck rubber and rims. So why do we mess with glue? Oh, yeah; it's the only way the darn tires will stay on.

At least that used to be the case. Now that Pro-Line's Bead-Loc design is here, we can have high style and put away the CA. Although not the first to release a glueless bead-grabbing design for monster trucks (Maximizer did it first), Pro-Line is the first with a fully licensed design from the full-scale world. It's Weld's Commando rim, styled out in bright chrome with down-to-the-last-bolt detail and a snap-in hubcap for a smooth look. Cast-alloy rings grab the tires with the clamping power of 36 screws, and Pro-Line's proprietary 23mm hex design gives the wheels plenty of mounting adaptability. Let's test 'em.

Specifications

Mounting diameter	3.8 in. (96.5mm)
Offset	-0.2 in. (-5mm)
Hex	23mm
Backspacing	1.9 in. (48.2mm)
Weight*	197g
Item no.	2680-00
Price	$45 (pair)

**Per wheel, with locking rings and hardware*

WILL THEY FIT MY TRUCK?

If your truck accepts Pro-Line's 23mm HD hexes, the answer is "yes." Currently, you can get the big hexes for Traxxas Maxx and Revo, HPI Savage, XTM Mammoth, Associated Monster GT and Tamiya TNX.

SPEND A LITTLE, SAVE A LOT

Bead-Locs are more expensive than standard 40 Series wheels ($45 a pair versus $25 for a pair of Pro-Line Cheyenne 23mm 40s), so you'll spend an extra 40 bucks to go glueless. But remember, you don't have to buy glue (savings: about $8), and much more important, you'll never have to toss the rims just to replace a set of tires. As soon as you swap a set of tires, the wheels will basically have paid for themselves. And I think convenience also has a value; as time-consuming as all those tiny screws can be, it sure beats gluing (or worse, trying to unglue) a full set of tires.

TESTING

As the ultimate test of the Bead-Loc's rubber-holding grip, I asked Monster Shop guy Kevin Hetmanski to use the new rollers on his dual-Collari-engine Giga Crusher project truck (check it out; it's in this issue). Kev did his best to unseat the tires with hard cornering on pavement, aggressive off-road driving and high-speed drag launches for the radar gun, but nothing even came close to budging the beads. If 7 horsepower isn't enough to rip the Moabs off the wheels, nothing will bust those suckers loose!

—Peter Vieira ■

RATING ●●●●◐

Pro-Line Racing *(951) 849-9781; pro-lineracing.com*

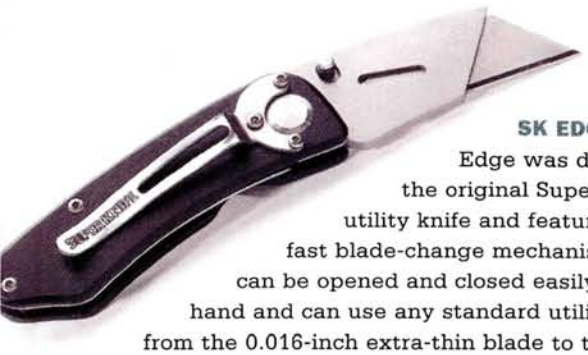
Mounting the Meats

I installed a set of Pro-Line 40 Series Moab tires for testing. If you have an old set of 40s that you plan to mount on the Bead-Locs, you may need to trim the bead for proper fit (the instructions show you how), but any current-production 40 will fit without modification. Installation is simple but time-consuming. You just slip the tire onto the rim in the usual

way, then line up the locking rings over their mounting holes and start firing the screws in. This will take a while, since there are 18 screws in each side of the wheel, and you can't just sock them down in one shot. You have to snug them up incrementally as you work your way around the rim in a criss-cross pattern. From start to finish, mounting four Moabs took me just over an hour.

SUPERKNIFE
SK Edge, Hobby SuperKnife and Ultrashear tools

Cutting tools are a must-have in any RC toolbox, and SuperKnife makes three types for you to choose from. These tools are solidly constructed and cleverly designed so that their blades are easy to replace.



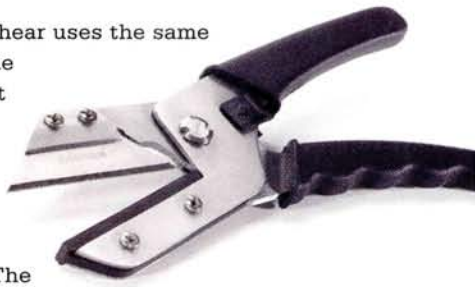
SK EDGE. The SK Edge was derived from the original SuperKnife folding utility knife and features a super-fast blade-change mechanism. This knife can be opened and closed easily with one hand and can use any standard utility knife blade from the 0.016-inch extra-thin blade to the .039-inch contractor-grade blade. I use the SK Edge to cut through all kinds of stuff and never worry about ruining the blade—unlike a regular pocket knife. When it's time for a fresh blade, it takes only a couple of seconds to depress the thumb stud to release the blade and replace it with a new blade. This tool is available in a rubberized and in an anodized-aluminum handle in several colors with a welded stainless-steel blade holder and belt clip. One of the best parts is that it is backed by a lifetime warranty.

RATING ●●●●●

HOBBY SUPERKNIFE. Basically a mini version of the folding utility knife, the Hobby SuperKnife uses a no. 11 hobby blade. When folded, it measures a mere 2.25 inches, and the sharp edge of the blade is protected within the aluminum handle—no more easy-to-lose knife caps. The entire tool measures 3.75 inches when locked open; it fit comfortably in my hand, and I found that it gives excellent control when cutting. The thumb studs come in handy not only to open the tool but also as a finger rest while cutting. Replacing the hobby blade is a cinch, thanks to a tiny Phillips setscrew. Unscrew it, slide out the used blade, install a new one and reinstall the setscrew. The Hobby SuperKnife is available in silver, black, blue, red and purple anodized colors.

RATING ●●●●●

ULTRASHEAR. The Ultrashear uses the same type of utility blade as the folding utility knife, but it works like an anvil-style cutter. Like all of SuperKnife's tools, the blade can be easily replaced and features a pushbutton safety lock. The more I used the Ultrashear, the more uses I discovered. It's great for cutting down body posts without crimping the plastic. My only gripe comes from the perfectionist in me: the cut ends up being a couple of degrees off from being perfectly perpendicular. Almost all plastic and most composite materials can be sliced by the Ultrashear. The large rubber grip handles and stainless-steel construction allow you to apply plenty of force to drive the blade through tough materials. You will find yourself trying to cut through anything you can find on your bench. Do yourself a favor and try them out at your buddy's bench. —*Paul Onorato* ■



RATING ●●●●◐

SK Edge (aluminum/rubberized)—item nos. vary; $15/$12

Hobby SuperKnife—525 (silver), 526 (black), 527 (blue), 528 (red), 529 (purple); $9

Ultrashear—521; $15

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Airtronics (714) 978-1895; airtronics.net.

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Horizon Hobby (800) 338-4639; horizonhobby.com.

Kyosho Corp. of America (800) 716-4518; kyoshoamerica.com.

Model Rectifier Corp. (MRC) (732) 225-2100; modelrectifier.com.

New Era Models (603) 888-4453; neweramodels.com.

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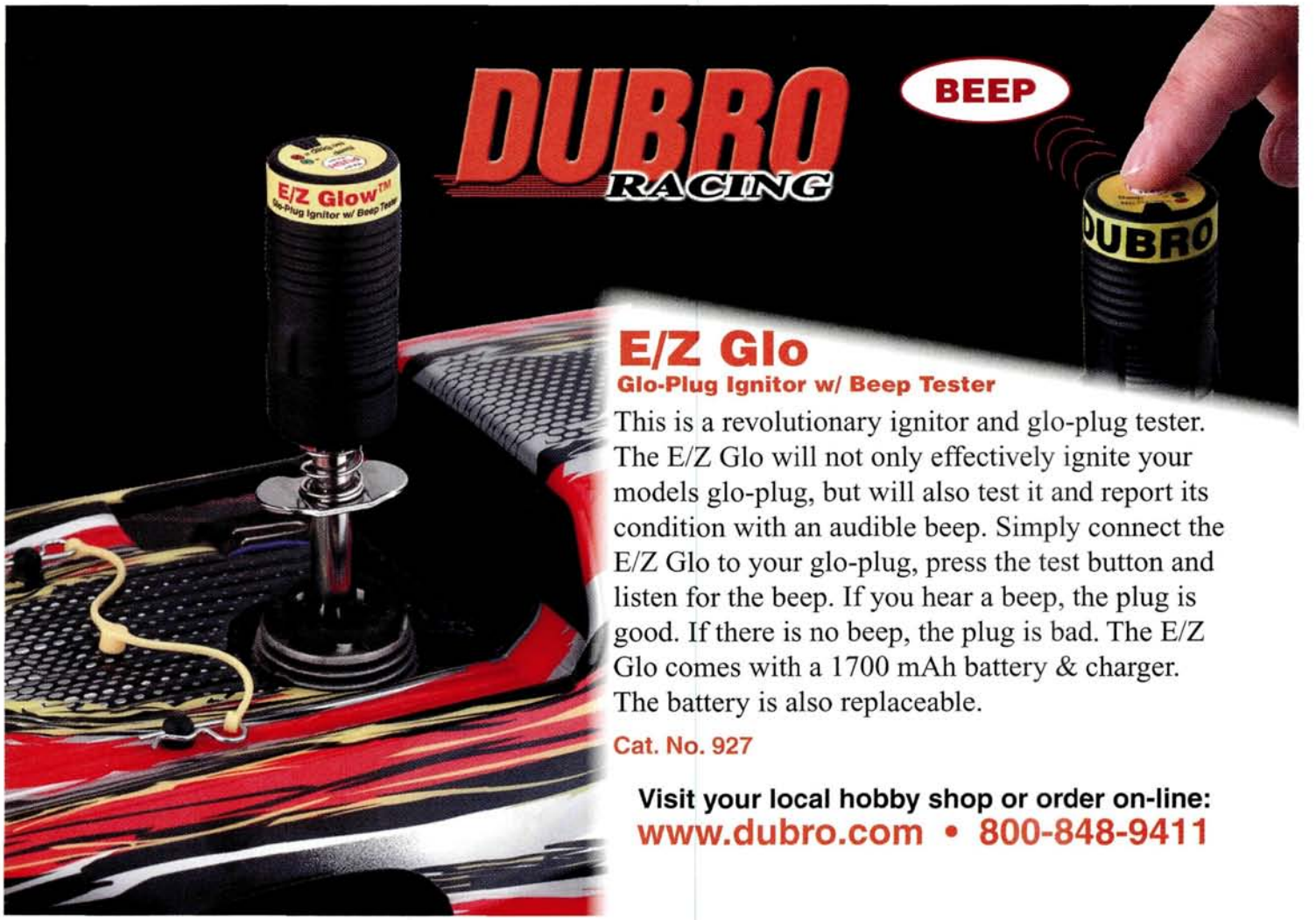

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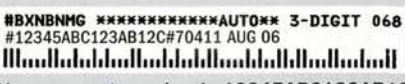

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RADIO CONTROL car action

CONTACT THE BACKLOT Email backlot@airage.com, or write to Backlot c/o *RC Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606 USA.

NAME THAT CAR

It's been a while since we've rolled out a contest, and it just so happens that our boy Jason Sams has some killer action photography just waiting for a home, so—presto!—instant Backlot! And not a moment too soon; we're on deadline! The object of this game is simple: just tell us the names of the pro drivers who wheel the cars you see here.

WHAT YOU WIN

Naming all the drivers correctly gets you in the running. If we select your entry in the random drawing, you'll win the Pro-Line body, tire and wheel package of your choice, custom painted by Bill Zegers of Zegers RC Graffix. Nice!

HOW TO ENTER

All we need are the drivers' names (numbered according to the pictures), your name, mailing address and phone number. Email your answers to backlot@airage.com, or snail-mail them to us at *RC Car Action*, attn: Name That Driver, 100 East Ridge, Ridgefield, CT 06877. Entries must be received by October 31, 2005. One entry per reader.